



The Sizewell C Project

6.1 Volume 1 Introduction to the Environmental Statement Chapter 6 EIA Methodology Appendices 6D - 6Y

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1. Conventional Waste and Material Resources Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant material resource use and conventional waste generation effects of the Sizewell C Project.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Volume 2, Chapter 8** of the **Environmental Statement (ES)**.

1.1.3 It outlines the methods and criteria used to:

- Define the study area and identify topic receptors.
- Establish the environmental baseline for topic receptors.
- Determine the value/sensitivity of receptors, the magnitude of change and significance of effect.

1.1.4 In order to assess the potential environmental effects associated with waste and materials generation and management activities, the assessment characterises the environmental baseline and then uses this baseline to assess the potential effects of the Sizewell C Project. The characterisation of environmental baseline and subsequent assessment considers the capacity of waste management facilities in Suffolk and East of England.

1.1.5 For a project of this size, waste is typically considered in the context of its impact at a regional level because local facilities would rarely be capable of servicing a major infrastructure project.

1.1.6 It is acknowledged that the use of material resources and the generation and management of waste would be likely to generate adverse environmental effects, predominantly through transportation (both to and from site), from detrimental impacts to air quality and increased local noise levels. However, these effects are dealt with in the following **Environmental Statement (ES)** (Doc Ref. Book 6) chapters:

- **Volume 2, Chapter 10 Transport.**
- **Volume 2, Chapter 11 and Volumes 3 to 9, Chapter 4 Noise and Vibration.**
- **Volume 2, Chapter 12 and Volumes 3 to 9, Chapter 5 Air Quality.**

- 1.1.7 Furthermore, the assessment of effects associated with contaminated land (such as impacts on groundwater, surface water and human health) are considered within the following **ES** chapters:
- **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** Geology and Land Quality.
 - **Volume 2, Chapter 19** and **Volumes 3 to 9, Chapter 12** Groundwater and Surface Water.
- 1.1.8 Where the potential for hazardous waste from contaminated land is identified, the assessment of this waste forms part of the scope of the conventional waste management assessment.
- 1.1.9 Radioactive waste is considered within **Volume 2, Chapter 7** of the **ES**.
- 1.2 [Legislation, policy and guidance](#)
- 1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant material resource use and waste generation effects associated with the Sizewell C Project.
- 1.2.2 Legislation and policy have been considered on an international, national, regional and local level. The following is considered to be relevant to the materials resource use and waste assessment, as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.
- a) [International](#)
- 1.2.3 The overarching European Directives that are applicable to the assessment of material resource use and waste generation are set out below:
- i. [Waste Framework Directive \(2008/98/EC\)](#)
- 1.2.4 The Waste Framework Directive (WFD) (Ref. 1.1) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It defines when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The WFD lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular, without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

1.2.5 The WFD sets out a five-step waste hierarchy as to how waste should be managed as an important requirement which applies to anyone who produces or manages waste. The waste hierarchy requires that waste is dealt with in the following order of priority:

- prevention;
- preparing for re-use;
- recycling;
- other recovery (for example energy recovery); and
- disposal, only as a last resort.

1.2.6 The following considerations must be taken into account:

- environmental protection principles of precaution and sustainability;
- proximity principle for treatment and disposal of waste to be as close to its source as possible;
- technical feasibility and economic viability;
- protection of resources; and,
- the overall environmental, human health, economic and social impacts.

ii. [Landfill Directive \(1999/31/EC\)](#)

1.2.7 The Landfill Directive (Ref. 1.2) aims to prevent, or reduce as far as possible, negative effects on the environment from the landfilling of waste and was implemented by Member States in 2001.

iii. [Hazardous Waste Directive \(91/689/EEC\)](#)

1.2.8 The Hazardous Waste Directive (Ref. 1.3) lays down strict controls and requirements for controlling hazardous wastes. Hazardous waste is any waste with hazardous properties that may make it harmful to human health and the environment and is defined by the European Waste Catalogue.

b) [National](#)

i. [Legislation](#)

1.2.9 A wide range of national legislation, policies and guidance that regulate the control and management of waste and use of material resources have been

considered. The key legislation relevant to the Sizewell C Project include the following.

The Environmental Protection Act 1990

- 1.2.10 The Environmental Protection Act (EPA) (Ref. 1.4) defines the fundamental structure and authority for waste management and control of emissions to the environment. It outlines:
- the definition of controlled waste;
 - the requirements of the duty of care with respect to waste and transfer of waste; and
 - waste collection and waste disposal authorities and their roles.
- 1.2.11 Waste management issues are considered under Part II of the EPA. Controlled waste includes commercial, industrial (including agricultural waste from 2006) and household waste. Under the Act, the deposition of waste to land without a licence or breaching licence is an offence. The Act is also designed to prevent environmental pollution or harm to human health by prohibiting treatment, storage and disposal of controlled wastes without a licence or in breach of a licence.
- 1.2.12 Under Section 45, Waste Collection Authorities have a general duty to collect residential waste within their area without charge. Additionally, they have a duty to collect commercial waste within their area where requested and can levy a charge for such services.
- 1.2.13 Under Section 46 in respect of residential waste, the Local Authority may require:
- Waste of certain types to be stored separately so that it can be recycled.
 - Occupiers of dwellings to provide bins of a specified type for storage of wastes.
 - Additional bins to be provided for separate storage of recyclable waste.
 - Locations of bins for emptying.
- 1.2.14 Section 47 states that Local Authorities may require the same provisions in Section 46, but in respect of commercial and industrial wastes.

The Waste (England and Wales) Regulations 2011 (SI 2011/988)

- 1.2.15 The Waste (England and Wales) Regulations 2011 (Ref. 1.5) implements parts of the revised WFD, particularly the principles of the waste hierarchy. These regulations require businesses to confirm that they have applied the waste management hierarchy when transferring waste and include a declaration on their waste transfer note or consignment note.
- 1.2.16 These Regulations have replaced the Environmental Protection (Duty of Care) Regulations SI 1991/2839, which stated that any organisation disposing of waste should be able to account for all of its waste and demonstrate that it was done legally.

Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154)

- 1.2.17 The Environmental Permitting (England and Wales) Regulations 2016 (Ref. 1.6) replace the Environmental Permitting (England and Wales) Regulations 2010. These regulations introduce a streamlined system of environmental permitting in England and Wales for certain installations, waste operations and mobile plants. They transpose provisions of fifteen EU Directives which impose obligations requiring delivery through permits or which are capable of being delivered through permits.
- 1.2.18 Activities under these regimes will be covered by a single form of environmental permit governed by one set of regulations. This provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances. It also sets out the powers, functions and duties of the regulators. Notably, the requirements of the Landfill Directive (1999/31/EC) (Ref 1.2) are applied under these regulations.

Controlled Waste (England and Wales) Regulations 2012 (SI 2012/811)

- 1.2.19 The Controlled Waste (England and Wales) Regulations 2012 (Ref. 1.7) came into force in April 2012, replacing the Controlled Waste Regulations 1992. They define household, industrial and commercial waste for environmental permitting purposes.
- 1.2.20 The regulations replaced Schedule 1 of the 1992 regulations with an updated schedule defining household waste, still by reference to its origin, but introducing some exceptions.
- 1.2.21 The regulations also specify that waste from construction or demolition works, including preparatory works should be *“treated as household waste*

for the purposes of section 34(2) and (2A) of the [EPA 1990] only (disapplication of section 34(1) and duty on the occupier of domestic property to transfer household waste only to an authorised person or for authorised transport purposes)”.

[Hazardous Waste \(England and Wales\) Regulations 2005 \(SI 2005/894\)](#)

1.2.22 The Hazardous Waste (England and Wales) Regulations 2005 (Ref. 1.8) aim to track and control hazardous waste movements. A consignment note is required prior to the removal of any hazardous waste. Hazardous wastes are wastes that exhibit certain properties (for example, they are potentially flammable, toxic or carcinogenic) such that they are or may (at or above certain concentrations) be detrimental to human health or the environment. Strict regulatory controls have been placed over the handling, storage, transportation, and disposal of hazardous wastes on account of the considerable risks they pose to human health and the environment.

1.2.23 Changes have been made to the Hazardous Waste (England and Wales) Regulations in the amendments in 2009 and 2016. The key changes are as follows:

- The 2009 regulations made it a legal requirement to declare on the waste transfer note, or consignment note for hazardous waste, that the waste management hierarchy has been applied to the waste.
- In addition, there was a change in the exemptions to apply as a hazardous waste producer, which only applied if the premises produce less than 500kg of hazardous waste a year.
- The 2016 regulations states that hazardous waste producers will no longer need to notify their premises with the Environment Agency.
- In addition, there is a change in the unique consignment note code which appears on every consignment note.

[Waste Electrical and Electronic Equipment Regulations 2013 \(SI 2013/3113\)](#)

1.2.24 The Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 (Ref. 1.9) became law in the UK on 1 January 2014 and replaced the 2006 Regulations. The WEEE Regulations transpose the requirements of the EU WEEE Directive (2012/19/EU) (the WEEE Directive). This legislation seeks to increase levels of separately collected WEEE and reduce the amount of WEEE going to landfill. It introduces the concept of ‘Producer Responsibility’ in which producers of Electrical and Electronic Equipment (EEE) are required to finance the cost of collection, treatment, reuse/recycling and recovery when that equipment becomes waste.

Waste Batteries and Accumulators Regulations 2009 (SI 2009/890)

- 1.2.25 The Waste Batteries and Accumulators Regulations 2009 (Ref. 1.10) set out requirements for waste battery collection, treatment, recycling and disposal for all battery types.

Control of Pollution (Oil Storage) (England) Regulations 2001 (SI 2001/2954)

- 1.2.26 The Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref. 1.11) impose general requirements for preventing the pollution of controlled waters from oil storage, in particular from fixed tanks or mobile bowers.

ii. Policy

National Policy Statements

- 1.2.27 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.12) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.13). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.28 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.29 A summary of the relevant NPS EN-1 requirements, together with consideration of how these requirements have been taken into account, is provided in **Table 1.1**. There are no specific requirements in NPS EN-6 in relation to the topic of conventional waste management and material resource use. Radioactive waste is dealt with in **Volume 2, Chapter 7** of the **ES**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement	How the Requirement has been Addressed
EN-1 Paragraph 5.14.2-5.14.3	EN-1 states that the waste hierarchy should be applied in order for sustainable waste management to be applied. Disposal of waste should only be considered where other waste	The conventional waste management strategy for the Sizewell C Project, provided in Volume 2, Appendix 8A of the ES identifies options for waste

Ref.	NPS Topic Requirement	How the Requirement has been Addressed
	management options are not available or where it is the best overall environmental outcome.	management in line with the principles of waste hierarchy.
Para. 5.14.6	The applicant should set out the arrangements that are proposed for managing any waste produced and prepare a Site Waste Management Plan. The arrangements described and Management Plan should include information on the proposed waste recovery and disposal system for all waste generated by the development, and an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome.	An Outline Site Waste Management Plan (SWMP) has been produced and is appended to the Conventional Waste Management Strategy included in Volume 2, Appendix 8A of the ES .
Para. 5.14.7	The Planning Inspectorate should consider the extent to which the applicant has proposed an effective system for managing hazardous and non-hazardous waste arising from the construction, operation and decommissioning of the proposed development. It should be satisfied that: <ul style="list-style-type: none"> any such waste will be properly managed, both on-site and off-site; the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area; and adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal, except where that is the best overall environmental outcome. 	This information is set out in the Volume 2, Chapter 8 of the ES and the appended Conventional Waste Management Strategy , provided in Volume 2, Appendix 8A of the ES .

The Waste Management Plan for England, 2013

- 1.2.30 Defra published the National Waste Management Plan England in December 2013 (Ref. 1.14). The plan uses the ‘waste hierarchy’ as a guide to sustainable waste management.
- 1.2.31 The Waste Management Plan for England evaluated how it would support the implementation of the objectives and provisions of the WFD.
- 1.2.32 The WFD established the principle of ‘proximity’. This is within the context of the requirement on Member States to establish an integrated and adequate network of waste disposal facilities for recovery of mixed municipal waste collected from private properties. The requirement included where such collection also covers waste from other producers.
- 1.2.33 The plan identifies the measures to be taken to ensure that by 2020 at least 50% by weight of waste from properties is prepared for re-use or recycling and at least 70% by weight of construction and demolition (C&D) waste is subjected to material recovery.
- 1.2.34 Key objectives of the plan were stated as follows:
- decoupling waste growth from economic growth with more emphasis on waste prevention and re-use;
 - meeting and exceeding the Landfill Directive diversion targets for biodegradable municipal waste;
 - increasing diversion from landfill and securing better integration of treatment for municipal and non-municipal waste;
 - securing the investment in infrastructure needed to divert waste from landfill and for the management of hazardous waste; and
 - getting the most environmental benefit from that investment, through increased recycling of resources and recovery of energy from residential waste using a mix of technologies.

Waste Prevention Programme for England 2013

- 1.2.35 The development of a Waste Prevention Programme is a requirement of the revised Waste Framework Directive (2008/98/EC) and takes forward a commitment in the Government Review of Waste Policy in England, 2011. The Waste Prevention Programme for England 2013 (Ref. 1.15) sets a number of objectives to help people and organisations make the most of opportunities to save money by reducing waste.

National Planning Policy Framework 2019

- 1.2.36 The National Planning Policy Framework (NPPF) (Ref. 1.16), first published in March 2012 and revised in July 2018 and February 2019, sets out the government's planning policies for England and how these are expected to be applied. It does not contain specific waste policies. In terms of achieving sustainable development, the NPPF (in section 2, paragraph 8c) identifies that minimising waste and pollution is a fundamental part of the environmental role of the planning system.
- 1.2.37 The NPPF encourages planning authorities to prepare local plans that, before considering extraction of primary materials and, so far as practicable, take account of the contribution of alternative, secondary and/or recycled materials and minerals waste and their beneficial impact on the supply of materials (section 17, paragraph 204b).

National Planning Policy for Waste 2014

- 1.2.38 The Government published the National Planning Policy for Waste for England in 2014 (Ref. 1.17), as a replacement of Planning Policy Statement 10 (Planning for Sustainable Waste Management – 2011). The updated policy maintains a continued focus of moving waste up the waste hierarchy.
- 1.2.39 The document sets out detailed waste planning policies to facilitate a more sustainable and efficient approach to resource use and management. This could be undertaken, for example, by ensuring the design and layout of new residential and commercial developments and other infrastructure complement sustainable waste management, including the provision of appropriate storage and segregation facilities to facilitate high quality collections of waste.
- 1.2.40 When determining planning applications for non-waste developments, the policy requires that local planning authorities should, to the extent appropriate to their responsibilities, ensure that:
- The likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the efficient operation of waste management facilities.
 - New, non-waste development makes sufficient provision for waste management and promotes good design to secure the integration of waste management facilities with the rest of the development and, in less developed areas, with the local landscape. This includes providing adequate storage facilities at residential premises, for example by ensuring that there is sufficient and discrete provision for bins, to

facilitate a high quality, comprehensive and frequent residential collection service.

- The handling of waste arising from the operation of developments maximises reuse/recovery opportunities and minimises off-site disposal.

Government's 25 Year Environment Plan

1.2.41 The Government's 25 Year Environment Plan (Ref. 1.18) sets out government action to help the natural world regain and retain good health. The proposals aim to tackle a number of growing problems including waste. It will champion sustainable development, lead in environmental science, innovate to achieve clean growth and increase resource efficiency to provide benefits to both our environment and economy. In doing so, the Government's 25 Year Environment Plan has identified six key areas to focus action on. The policy area relevant to the assessment of waste and material resource is as follows:

- Chapter 4: Increasing resource efficiency and reducing pollution and waste:
 - maximising resource efficiency and minimising environmental impacts at end of life;
 - achieving zero avoidable plastic waste by the end of 2042;
 - reducing food supply chain emissions and waste;
 - reducing litter and littering;
 - improving management of residual waste;
 - cracking down on fly-tippers and waste criminals;
 - reducing the impact of wastewater;
 - reducing pollution;
 - publishing a Clean Air Strategy;
 - curbing emissions from combustion plants and generators;
 - publishing a Chemicals Strategy;
 - minimising the risk of chemical contamination in our water; and
 - ensuring we continue to maintain clean recreational waters and warning about temporary pollution.

1.2.42 A number of goals and targets are set out in the strategy, namely section 8 on minimising waste (which sits under the heading – managing environment pressures). These include the aim to:

- minimise waste, reuse materials as much as possible and manage materials at the end of their life to minimise the impact on the environment.

1.2.43 This is intended to be done by:

- Working towards the ambition of zero avoidable waste by 2050.
- Working to a target of eliminating avoidable plastic waste by end of 2042.
- Meeting all existing waste targets – including those on landfill, reuse and recycling – and developing ambitious new future targets and milestones.
- Seeking to eliminate waste crime and illegal waste sites over the lifetime of the plan, prioritising those of highest risk. Delivering a substantial reduction in litter and littering behaviour.
- Substantially reducing and where possible preventing all kinds of marine plastic pollution – in particular material that came originally from land.

c) Regional

i. Suffolk Minerals and Waste Local Plan 2019

1.2.44 Following the Planning and Compensation Act of 2004, Suffolk County Council (SCC) produced the following minerals and waste Development Plan Documents (DPDs):

- Suffolk Minerals Core Strategy (adopted 2008).
- Suffolk Minerals Site Specific Allocations (adopted 2009).
- Suffolk Waste Core Strategy (adopted 2011).

1.2.45 A single Suffolk Minerals & Waste Local Plan (Ref. 1.19) is currently being developed to replace all three of the existing DPDs. On 24 May 2018, SCC agreed to consult on the new draft Minerals and Waste Local plan from 11 June to 23 July 2018. The Plan was submitted to the Planning Inspectorate on 21 December 2018 in preparation for the Examination in Public hearing, which was held in June 2019. The Suffolk Minerals and Waste Development Scheme 2018 states that the Plan was expected to be adopted by the end of

2019, but at the time of writing this appendix, this has not yet taken place. The Plan will make provision for minerals and waste development until 2036 within the context of Town and Country Planning Act 1990 and relevant guidance, and in co-operation with surrounding local authorities including through the East of England Aggregates Working Party and the East of England Waste Technical Advisory Body.

- 1.2.46 In terms of waste, this means planning for the provision of waste facilities equivalent to the amount of waste arising within the administrative boundary of SCC.

d) Local

- 1.2.47 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.48 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

- 1.2.49 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

- 1.2.50 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

ii. Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies, 2013

- 1.2.51 The Suffolk Coastal District Council (SCDC) Core Strategy (Ref. 1.20) is a DPD which forms part of the Suffolk Coastal District Local Plan, covering the period 2010 to 2027. The following policies are of relevance to the assessment of waste and material resource use:

- Strategic Policy SP12 – Climate Change which states that SCDC (now East Suffolk Council (ESC)) will expect for developments to minimise the use of natural resources by utilising recycled materials where appropriate, minimise greenhouse gas emissions, incorporate energy

efficiency, encourage the use of public transport, help to reduce waste and minimise the risk of pollution.

- Development Management Policy DM22 – Design: Function which states that new developments should make provision to enable access, turning and manoeuvring for emergency vehicles and the collection of waste.

iii. **Suffolk Coastal District Council Final Draft Local Plan**

1.2.52 The following policies included in the Final Draft Local Plan (Ref. 1.21) are of relevance to the assessment of waste and material resource use:

- Draft Policy SCLP3.5 Infrastructure Provision states that to support the provision of waste management infrastructure, where the size of the development allows for it, 'bring sites' should be included in the design and layout of developments to encourage recycling measures and to reduce the demand on household waste recycling centres.
- Policy SCLP9.2 Sustainable Construction states that development proposals are encouraged to set out measures for minimising waste arising from the construction process.
- Policy SCLP11.1 Design Quality states that development proposals should ensure that the layout and design incorporates adequate provision for the storage and collection of waste and recycling bins in a way which does not detract from the appearance of the development.

e) **Guidance**

1.2.53 This assessment has been undertaken in accordance with the following additional guidance documents:

- Site Waste Management Plans – Guidance for Construction Contractors and Clients Voluntary Code of Practice (2004) (Ref. 1.22).
- Construction Code of Practice for Sustainable Use of Soils on Construction Sites (2009) (Ref. 1.23)
- CL:AIRE Definition of Waste: Development Industry Code of Practice (2011) (Ref. 1.24)
- Where appropriate, Design Manual for Roads and Bridges (DMRB) Volume 11, Section, Part 5 Assessment and Management of Environmental Effects (HE 205/08) (Ref. 1.25); and

- Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 13 LA 110 Sustainability and Environment Appraisal. Material assets and waste (Ref. 1.26).

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 This section provides specific details of the conventional waste management and material resource use assessment methodology. The scope of assessment considers the impacts of the construction and operation of the main development site and associated development sites and removal and reinstatement of the temporary development.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

- 1.3.5 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. On 13th June 2019, a joint consultation meeting was held at the Environment Agency office in Ipswich. The meeting was attended by the interested stakeholders and a presentation of the proposed **Conventional Waste Management Strategy**, appended at **Volume 2, Appendix 8A** of the **ES** was given. A summary of the general comments raised and SZC Co's responses are detailed in **Table 1.2**.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the conventional waste and materials assessment.

Consultee	Date	Comment	SZC Co. Response
Environment Agency	Meeting held on 13 th June 2019. Comments received via	The Environment Agency accepted that SZC Co.'s own Key Performance Indicators (KPIs) and targets have yet to be finalised. Statutory targets for the recycling of specific materials	Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES has been updated in line with

Consultee	Date	Comment	SZC Co. Response
	email on 18 th June 2019	should be considered. The Environment Agency suggested that rather than creating two consolidation centres, one dedicated permitted waste management facility on site could be provided, which would be managed by an existing local waste management company and where all wastes could be source segregated and stored. SZC Co. would then be able to measure its waste and resource performance locally.	Environment Agency's comments received.
		SCC are updating their waste strategy and so references to the existing 2011 Core Strategy should be replaced with the imminent SCC Waste and Minerals Plan which covers to 2036.	
		Energy from Waste (EfW) options should be considered in line with the waste hierarchy and one of SZC Co's targets should be zero waste to landfill.	
	Meeting held on 13 th June 2019. Comment received via email on 18 th June 2019	The Environment Agency do not have any further comments to add in addition to the response already provided but would welcome the opportunity to engage further on the possibility of a dedicated waste transfer station on site, if SZC Co. choose to explore this option, and to review the final strategy prior to DCO application submission.	
Suffolk County Council and East Suffolk Council	Meeting held on 13 th June 2019. Comments received via email on 1 st July 2019	The report outlines a waste management strategy for all non-radioactive waste which will be produced during the construction phases, operational phases and where relevant, the post operational and decommissioning phases. The report only takes into account non-radioactive waste streams. The report does not consider the management of conventional waste arisings in the future decommissioning.	The management of conventional waste arisings in the future decommissioning of the power station will be considered in a separate Decommissioning Waste Management Plan in line with regulatory requirements. For further information see Volume 2, Chapter 5 of the ES .
		It is important that the waste is segregated into appropriate waste	The storage calculations in the Conventional Waste

NOT PROTECTIVELY MARKED

Consultee	Date	Comment	SZC Co. Response
		streams prior to leaving the site for treatment facilities.	Management Strategy provided in Volume 2, Appendix 8A of the ES are based on source segregation of the waste streams being undertaken.
		The segregation of waste must happen on site using the provision areas. It is noted that SZC Co. currently has no specifically defined locations for waste consolidation centres. SCC and ESC would encourage that these are located towards the west of the site, close to the stockpiling areas.	An indication of the area required for waste consolidation is provided in the Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES . The contractors will be responsible for determining the exact location of waste consolidation centres. This is to be sited to minimise nuisance and risk of pollution to sensitive receptors, provided in Code of Construction Practice (Doc Ref. 8.11).
		When defining the locations for the waste consolidation centres it is important that human receptors are considered, along with the cumulative impact of other operations and projects.	
		The waste capacity figures for facilities located in Suffolk that were presented are based on Environment Agency permitting. It must be noted that these figures do not represent up to date real capacity figures. Environment Agency permits are issued in 'bands' therefore a site could have considerably less real-time available capacity, especially landfills. The Environment Agency permitting process is a different system and falls under different legislation to the planning process.	In the absence of more accurate information, the publicly available permitted capacity data have been used. This data has also been updated on the basis of waste capacities included in the Waste Data Interrogator for 2018.
		It is noted that Foxhall Landfill is not included in Table 21 'Landfills located within Suffolk with sufficient remaining capacity' (Page 68).	Foxhall Landfill was not included in the Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES as on the basis of waste capacity data used, no remaining capacity from the end of 2015 was assumed. The strategy only includes landfills that will have remaining capacity after 2022 when the construction work is expected to start.

Consultee	Date	Comment	SZC Co. Response
		<p>SCC queried whether the unsuitability of EfW facilities to accept waste from the Sizewell C Project could be substantiated with further data.</p>	<p>The Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES has been updated to clarify that construction waste specifically may not be suitable for EfW facilities due to calorific values. The EfW facility would potentially be suitable for accepting residual wastes from the Sizewell C Project.</p>
		<p>The construction waste arising figures, broken down into specific waste streams over the construction, operational and decommissioning years have not been included in the report. These figures must be assessed in accordance with the projected waste arisings in Suffolk to demonstrate whether there is capacity or not within Suffolk.</p>	<p>Construction waste arisings for specific waste streams based on composition data from WRAP's report have been provided in the Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES, however these cannot be matched to projected Suffolk data for the specific construction waste streams as this information is not available. Therefore, the figures calculated in the Conventional Waste Management Strategy provided in Volume 2, Appendix 8A of the ES have been compared to the Suffolk projected waste arisings for the overall construction waste arisings from the Sizewell C Project.</p>
		<p>To help reduce waste arisings, especially with the construction of roads and hard standings, a 'cut and fill' method is advised.</p>	<p>Cut and fill has been established as far as reasonably practicable at this stage, however additional reuse opportunities may arise on site during the construction to help reduce the surplus. Further information can be found in the Materials Management Strategy provided in Volume 2, Appendix 3B.</p>

Consultee	Date	Comment	SZC Co. Response
		The implementation of parts of the strategy needs to consider the potential for nuisance, in particular noise, dust and odour. Waste collection areas, particularly the large collection areas utilising the 40-yard skips need to be sited in such a way as to prevent nuisance.	Measures to avoid nuisance and minimise the risk of pollution have been set out within the Code of Construction Practice (Doc Ref. 8.11).

c) Study area

- 1.3.6** There is no specific industry guidance available that provides definitions for study areas for waste and material resource use assessment. Therefore, the study areas for the assessment are based upon the professional judgement of suitably qualified, competent and experienced specialists applying knowledge and experience gained from similar projects.
- 1.3.7** Based on professional judgement, geographically distinct study areas to examine the use of material resources and the generation and management of waste have been used within the assessment.
- 1.3.8** The first study area is the area within the site boundary of the proposed development, as this constitutes the area within which construction materials would be consumed (used, reused and recycled) and within which waste would be generated.
- 1.3.9** The second study area needs to be sufficient to identify the suitable waste management infrastructure likely to accept the waste generated by the Sizewell C Project, and their location and capacity to accept waste. It also takes into consideration the feasible sources and availability of construction materials required for the proposed development.
- 1.3.10** The second study area for the receiving waste management facilities has been selected based on the nearest appropriate installation principle. Therefore, the waste management capacity of facilities in Suffolk has been used for both inert and non-hazardous waste. Non-hazardous and hazardous waste would be sent to facilities in the East of England, as there are no appropriate non-hazardous or hazardous waste management facilities in Suffolk. Therefore, for the purposes of the waste assessment, this second study area is the county of Suffolk, but extended to a radius of up to 100km from the main development site boundary to cover facilities within East of England for non-hazardous and hazardous waste.
- 1.3.11** For the assessment of material resource use, an assessment against the UK national demand is also undertaken.

d) **Assessment scenarios**

1.3.12 The conventional waste and material resource use assessment considers two scenarios, one for construction and one for the operational phase of the Sizewell C Project. Decommissioning of the Sizewell C power station is considered in **Volume 2, Chapter 5** of the **ES**.

i. **Construction**

1.3.13 The construction assessment scenario covers the entire Sizewell C Project construction duration and includes:

- activities occurring during the construction phase at the main development site, including:
 - construction at the main development site;
 - operational wastes from the accommodation campus and caravan park; and
 - removal and reinstatement of temporary development from the temporary construction area and Land East of Eastlands Industrial Estate (LEEIE).
- construction, operation and removal and reinstatement of the following temporary associated developments:
 - northern park and ride at Darsham;
 - southern park and ride at Wickham Market;
 - freight management facility; and
 - proposed rail extension route.
- construction of and operation of the following permanent associated development:
 - two village bypass;
 - Sizewell link road;
 - Yoxford roundabout and other highway improvements; and
 - proposed rail improvement works.

1.3.14 Construction phase impacts from the activities listed above may potentially arise during the whole of the construction works, which is expected to be a period of 9-12 years in total. The assessment takes into account peak years during which works are going to be undertaken.

ii. Operational phase

1.3.15 The operational assessment scenario starts once the Sizewell C power station is operational and includes:

- Operation of the main development site (the Sizewell C power station). The operational life of the Sizewell C power station is assumed to be 60 years.
- Operation of the following permanent associated developments:
 - two village bypass;
 - Sizewell link road; and
 - Yoxford roundabout and other highway improvements.

1.3.16 For the operational phase the temporal scope has been determined by the assumed date of the first electricity generation in 2034.

e) Assessment criteria

1.3.17 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.18 The assessment criteria used to assess the potential effects on conventional waste and material resource use arising from the Sizewell C Project differs from the generic EIA methodology and is described in detail below.

1.3.19 The significance of effects has been assessed using waste management capacity and material resource demand information, where the estimated quantities of wastes generated by the Sizewell C Project and requirements for material resources have been compared with waste management capacity and existing resource use demand to identify the likely magnitude of effects on existing waste management infrastructure and material resource markets respectively, as shown **Table 1.3**.

1.3.20 There is no specific industry guidance available that provides assessment criteria for determining the impact of materials and waste for projects such as Sizewell C. The assessment criteria used to assess the effects of the Sizewell C Project have been developed specifically for the purposes of the waste and materials assessment and are based on professional judgement and experience from previous, similar projects as per **Table 1.3**. Therefore, in this context, effects have been identified and their significance assessed

based upon the professional judgement of suitably qualified, competent and experienced specialists applying knowledge and experience gained from similar projects.

Magnitude of effect

- 1.3.21 The magnitude of effect is a measure of the scale or extent of the change in the baseline condition, irrespective of the value of the receptor(s) affected. The criteria used to determine the magnitude of effect and its significance are set out in **Table 1.3**.

Table 1.3: Criteria used to determine the magnitude of effect and its significance

Magnitude	Topic Specific Criteria	Significance of Effect
Major	The proportion of the waste management capacity that the waste would require is 10% and over of the waste infrastructure capacity in Suffolk and East of England. Resource use forms more than 10% of the demand, potentially causing a significant burden on the material resource markets.	Significant
Moderate	The proportion of the waste management capacity that the waste would require is greater than 5% but less than 10% of the infrastructure capacity in Suffolk or East of England. Resource use forms more than 5% but less than 10% of the demand, potentially causing a significant burden on the material resource markets	
Minor	The proportion of the waste management capacity that the waste would require is between 1% and 5% of the infrastructure capacity in Suffolk or East of England. Resource use forms more than 1% but less than 5% of the demand, potentially causing a small effect on the material resource markets.	Not significant
Negligible	The proportion of the waste management capacity that the waste would require is less than 1% of the infrastructure capacity in Suffolk or East of England. Resource use forms less than 1% of the demand, which would not significantly affect the material resource markets.	

- 1.3.22 Whilst this assessment considers the adverse effects of resource use, the economic benefits of the additional spend are considered within **Volume 2, Chapter 9** of the **ES**.

Assessment of significance

- 1.3.23 This assessment considers an effect to be ‘significant’ for the purposes of the EIA, if it is identified to result in a major or moderate magnitude of effect to

the waste management capacity or resource demand. For the effect to be considered 'not significant', it is identified to result in a minor or negligible magnitude of change.

- 1.3.24 Professional judgement has been used in relation to the specific circumstances and anticipated effects on treatment/disposal route and capacity of waste management facilities when attributing the level of significance. There may be instances where professional judgement and experience would result in the prediction of a different level of effect (e.g. where identified receptors experience instances of combined beneficial and adverse effects).
- 1.3.25 The significance of effect is determined with consideration for the embedded mitigation measures. These are measures that are integral to the Sizewell C Project and are incorporated within the design. In addition to the embedded mitigation, there are also a number of good practice mitigation measures that would be applied. These include actions that would be undertaken to meet existing legislative requirements, or actions that are considered to be standard practices used to manage effects.
- 1.3.26 Where necessary, additional mitigation is provided, if effects are predicted which would not be fully addressed by embedded or good practice mitigation. Effects following implementation of embedded, good practice and additional mitigation are referred to as 'residual effects'.

f) **Assessment methodology**

- 1.3.27 This assessment determines the potential impacts on material resources and waste management infrastructure which are likely to arise from the construction, operation and removal and reinstatement phases of the Sizewell C Project. The methodology is set out in the sections below.
- 1.3.28 The receptors likely to be subject to impacts as a result of the use of material resources include quarries and other sources of minerals, and other finite raw material resources. The potential impacts associated with the use of material resources on these receptors include:
- the depletion of non-renewable resources; and
 - the impact on the national demand for materials.
- 1.3.29 The receptors likely to be subject to impacts as a result of waste generation and management are landfills and other waste management infrastructure potentially suitable for accepting waste from the Sizewell C Project. These include (but are not limited to) material recovery facilities, waste transfer and

treatment stations, composting facilities, energy recovery facilities, incineration plants and landfills.

1.3.30 The potential impacts associated with the generation and management of waste on these receptors include:

- utilisation and depletion of the remaining local landfill capacity; and
- suitability and occupation of available waste management infrastructure.

1.3.31 The assessment of effects on material assets and waste generation includes effects arising during: the construction of the Sizewell C Project up until the point when the proposed development is operational; and the operation of the proposed development in relation to maintenance for the lifetime of the proposed development. Significant environmental effects are more likely to arise from those materials or waste which:

- are associated with the largest quantities;
- are primary/virgin materials; and
- have hazardous properties.

1.3.32 With this in mind, the assessment of effects has been based on several factors, including:

- the availability of the material resources;
- the type of materials required, e.g. primary/virgin materials, manufactured materials, recycled materials;
- the type of waste generated, e.g. inert, hazardous;
- the availability of suitable facilities within close proximity to the proposed development to treat the waste generated; and
- compatibility of the Best Practicable Environmental Option (BPEO) for the waste within the context of the waste hierarchy, i.e. whether generation of the waste can be minimised, the waste can be recycled, landfilled etc.

i. Establishing the baseline

1.3.33 For material resource use, the baseline assessment considers the existing demand for construction materials in the UK and Suffolk.

- 1.3.34 The waste generated from the construction and operation of the Sizewell C Project and removal and reinstatement of any temporary associated development, including the accommodation campus, park and ride areas and caravan park, could potentially affect receiving waste management facilities. Therefore, for the purposes of this assessment, the baseline is characterised in terms of the ability of the waste management facilities to handle the wastes generated.

Existing baseline

- 1.3.35 The most recent publicly available information on the demand for key construction materials within the UK and Suffolk has been used to provide the baseline for material resources. This information has been determined through a desk-study using a number of readily available resources, including the following:

- International Steel Statistics Bureau (2018), Steel Demand (Ref. 1.27).
- Minerals Products Association (2019), The Contribution of Recycled and Secondary Materials to Total Aggregates Supply in Great Britain (Ref. 1.28).
- Suffolk County Council (2019), Suffolk Local Aggregates Assessment (2018 data) (Ref. 1.29).

- 1.3.36 The most recent publicly available information relating to current waste generation and operational waste facilities in Suffolk and the East of England region has been gathered to provide the baseline for the waste assessment. Information on the current waste arisings and the waste management facilities have been determined through a desk-top study using a number of readily available resources, including the following:

- Suffolk County Council (2018), Suffolk Minerals and Waste Local Plan – Suffolk Waste Study (Ref. 1.30).
- Suffolk County Council, Online Planning Application Database (Ref. 1.31).
- Environment Agency (2019) Waste Data Interrogator 2018 (Ref. 1.32).
- Defra (2016) ENV23 – UK Statistics on Waste (Ref. 1.33).
- Environment Agency (2019) Permitted Waste Sites - Authorised Landfill Site Boundaries (Ref. 1.34).
- Environment Agency (2019) Historic Landfill Sites (Ref. 1.35).

- Environment Agency (2019) Remaining Landfill Capacity (Ref. 1.36).
- Environment Agency (2019) Environmental Permitting Regulations – Waste Operations (Ref. 1.37).
- Environment Agency (2018), Waste Management in England 2018 data summary (Ref. 1.38).
- Environment Agency (2018), Waste management in East of England 2018: data tables (Ref. 1.39).

Future baseline

- 1.3.37 The future baseline has been assessed on the basis of a desktop review of the waste forecast data from Suffolk County Council in the form of the Suffolk Waste Study 2018 (Ref. 1.30).
- 1.3.38 Changes to existing conditions are also considered with due regard to committed developments, existing and proposed land uses. Where these aspects were considered to impact on baseline conditions in the future, these are described further under future baseline in **Volume 2, Chapter 8** of the **ES**.
- 1.3.39 A cumulative assessment with non-Sizewell C developments is provided in **Volume 10, Chapter 4** of this **ES**.
- ii. [Assessment of waste quantities and material use associated with Sizewell C Project](#)
- 1.3.40 The methodology for calculating the anticipated waste arisings to be generated by the Sizewell C Project and its associated developments are set out in **section 1.4** of the **Conventional Waste Management Strategy**, provided in **Volume 2, Appendix 8A** of the **ES**. This is summarised below.
- 1.3.41 In order to calculate the anticipated waste volumes for the construction of the main development site and associated developments, waste quantities for similar facilities at Hinkley Point C have been reviewed and adjusted accordingly to floor areas, number of parking spaces and so on specific to Sizewell C Project.
- 1.3.42 The construction waste arisings from the rail and road infrastructure were based on BRE Smartwaste's waste benchmark data (Ref. 1.40).
- 1.3.43 The operational waste arisings generated at the Sizewell C power station were based on the annual arisings estimates given in SZC Co. and Areva's

‘Generic Design Assessment (GDA) UK EPR – Integrated Waste Strategy Document’ for EPRs (Ref. 1.41).

- 1.3.44 The operational waste volumes estimated for the accommodation campus were based upon the Department for Environment, Food and Rural Affairs’ (Defra) local authority collected waste generation statistics from April 2018 to March 2019 for SCC and SCDC (Ref. 1.42). Furthermore, consideration was taken of British Standard 5906 (Ref. 1.43), which provides estimates of operational waste generation for various developments, in addition to other data sources.
- 1.3.45 The waste volume estimates for the removal and reinstatement of temporary development were based on relevant Hinkley Point C figures.
- 1.3.46 Estimates for material resource use are taken directly from the relevant sections in **Volume 2, Chapter 3** and **Volumes 3 to 9, Chapter 2** of the **ES**.

iii. Assessment of effects

- 1.3.47 The assessment of effects on material resource use demand and waste management facilities includes a comparison of estimated material use and waste quantities associated with the Sizewell C Project against existing material resource demand and capacity within the waste management infrastructure respectively. The assessment is undertaken against the criteria set out in **Table 1.3**.
- 1.3.48 For example, as set out in **Table 1.3**, if the waste volume is less than 1% of the infrastructure capacity in Suffolk (or East of England for non-hazardous and hazardous waste), the magnitude of effect is considered negligible. If the waste generated is between 1% and 5% of the infrastructure capacity, the magnitude is minor. If greater than 5% and less than 10%, the magnitude is considered to be moderate. If the waste is above 10% of the infrastructure capacity in Suffolk (or East of England for non-hazardous and hazardous waste), the magnitude is considered major.
- 1.3.49 The latest published data relating to waste management facilities’ capacities have been used to assess the level of impact from the proposed development. Details of the permitted facilities are provided in **Volume 2, Appendix 8A** of the **ES**, and include the capacity (tonnes per annum, where available), location and distance from the Sizewell C Project.
- 1.3.50 Where there is limited capacity available, there is a risk that the waste produced by the Sizewell C Project would use a significant proportion of the available capacity of existing non-hazardous waste management/disposal facilities, potentially resulting in displacement of other waste to alternative facilities outside of the East of England.

iv. Inter-relationships

- 1.3.51 There are no inter-relationship effects on the receptors considered within this assessment (i.e. material resource demand and waste management infrastructure).
- 1.3.52 The assessment of the management of waste is inter-related with the assessment of impacts set out other chapters as described below.
- 1.3.53 The likely presence of contaminated soil is set out in **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** Geology and Soils of the **ES**.
- 1.3.54 Where the potential for hazardous waste from contaminated land is identified, the conventional waste and materials management assessment, **Volume 2, Chapter 8** and **Appendix 8A** of the **ES** addresses the management of this waste.
- 1.3.55 During the construction and operational phases, there is potential for materials and waste to leach or cause run off which could have impact on sensitive receptors, including controlled waters. The risks to the water environment from contaminated and other waste materials are described in **Volume 2, Chapter 19** and **Volumes 3 to 9, Chapter 12** of the **ES**, Groundwater and Surface Water.
- 1.3.56 Effects associated with the transport of waste and materials are dealt with in **Volume 2, Chapter 10** Transport, **Volume 2, Chapter 11** and **Volumes 3 to 9, Chapter 4** Noise and Vibration, **Volume 2, Chapter 12** and **Volumes 3 to 9, Chapter 5** Air Quality. These are all within the **ES**.

v. Assumptions and limitations

- 1.3.57 The following assumptions have been made in this assessment.
- 1.3.58 The conventional waste and materials management assessment has been based on the description of the Sizewell C Project in **Chapters 2 to 4** of **Volume 2** and **Chapter 2** of **Volumes 3 to 9** of the **ES**. The assumptions made for the calculation of material and waste quantities are outlined in **Chapter 3** of **Volume 2**, **Chapter 2** of **Volumes 3 to 9** and in **Volume 2, Appendix 8A** of the **ES**. These figures are intended for the purpose of the current assessment only and have been based on a likely worst-case scenario, using the design information currently available.
- 1.3.59 Baseline information, potential effects and mitigation are described based on available information. The level of detail provided at this time to estimate waste tonnages and waste management requirements is limited by the design information available. The assessment assumes that there will be no

requirement for export of clean excavated material from the Sizewell C Project area.

- 1.3.60 This assessment has not considered the environmental effects associated with the off-site extraction of raw materials used for the off-site manufacture of products. These stages of the products' or materials' life-cycles are outside of the scope of the assessment due to the range of unknown variables associated with the processes involved, and are not considered to form part of the Sizewell C Project. In most cases, it can also be assumed that these processes would have already been subject to EIA in securing consents for the facilities' operation.
- 1.3.61 The assessment has not considered waste and material types and quantities for the decommissioning of the Sizewell C power station at the end of its lifetime. Arrangements for the decommissioning process would be refined periodically, and a Decommissioning Waste Management Plan developed in line with existing regulatory requirements, prior to commencement of decommissioning, which will detail information on decommissioning waste and materials types and quantities and how this would be managed, provided in **Volume 2, Chapter 5** of the **ES**.
- 1.3.62 The assessment has not considered the sterilisation of any mineral safeguarding areas or peat resources, as this has been dealt with in **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** of the **ES**, Geology and Land Quality.
- 1.3.63 Operational waste such as office, canteen and maintenance waste is included in the assessment; however, due to its limited nature the following operational waste has not been estimated:
- Green waste – there would be areas of landscaping and grass but these would be managed for ecological purposes or otherwise grazed and, therefore, large quantities of green waste are unlikely. Any maintenance of these areas would be undertaken by a specialist service provider. Under terms of their contract they would be responsible for removing the waste from site.
 - Clinical waste – there would be a number of medical treatment facilities on-site which would generate small quantities of clinical waste including sharps, and offensive and infectious wastes. A specialist waste management contractor would be appointed to manage these wastes and they would be collected directly from the location where they are produced.
 - Feminine hygiene waste – all cubicles within the female toilets would have provision for feminine hygiene waste disposal. A specialist waste

management contractor would be appointed to manage these wastes and they would be collected directly from the location where they are produced.

- 1.3.64 Information on permitted capacity of waste management facilities has been used in the assessment based on current publicly available data (at the time of writing). However, it should be noted that the capacity information obtained from the Environment Agency for the sites and regions identified does not necessarily mean that the capacity detailed would be available to use by the Sizewell C Project.
- 1.3.65 It is noted that any future changes to this permitted capacity and throughput are uncertain. It is also difficult to assess the available capacity due to the commercial sensitivity of existing contracts and the timescales over which waste would be produced by the Sizewell C Project. It is likely that additional capacity would become available. However, it is not currently possible to predict the timeframes for when these new waste management facilities would become available and, therefore, how many of these sites would be available to accommodate waste arisings from the proposed development. It is also possible that some of the existing waste management facilities might close or be unavailable during the lifetime of the Sizewell C Project.
- 1.3.66 The procurement strategy for the materials required for the construction of the proposed development is unknown at this stage. For the purposes of this assessment, it has been assumed that, apart from bulk fill, not all materials would be available to be sourced regionally (within Suffolk), and that the majority would be sourced nationally (within the UK). This represents the (environmentally) worst case scenario.

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VOLUME 1, CHAPTER 6, APPENDIX 6E: SOCIO-ECONOMICS ASSESSMENT METHODOLOGY

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None provided.

1 Socio-economics Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant socio-economic effects of the Sizewell C Project. The socio-economic assessment is project-wide in nature, so this appendix applies to the overall socio-economic assessment.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Volume 2, Chapter 9** of the **ES** (Doc Ref. 6.3).

1.1.3 The Socio-economics chapter of the **ES** subsequently informs other documents submitted with the Development Consent Order (DCO) application, primarily the **Accommodation Strategy** (Doc Ref. 8.10) and the **Economic Statement** (Doc Ref 8.9). The socio-economics assessment draws on a number of technical documents which are appended to the Socio-economics chapter, provided at **Volume 2, Chapter 9** of the **ES**, that set out key project assumptions and baseline reviews for the assessment. These are as follows:

- **Volume 2, Appendix 9A**– Technical Note 1: Workforce Profile.
- **Volume 2, Appendix 9B** – Technical Note 2: Demographic Benchmarks and Workforce Characteristics.
- **Volume 2, Appendix 9C** – Technical Note 3: Spatial Distribution of the Workforce.
- **Volume 2, Appendix 9D** – Technical Note 4: Accommodation Datasets and Assumptions.
- **Volume 2, Appendix 9E** – Technical Note 5: Leisure Audit and Estimated Demand.
- **Volume 2, Appendix 9F** – Sizewell C: Suffolk Coast Visitors Survey.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant socio-economic effects associated with the proposed development.

1.2.2 Legislation and policy have been considered on an international, national, regional and local level. The following is considered to be relevant to the

socio-economic assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) **International**

- 1.2.3 There is no international legislation or policy directly relevant to the socio-economic assessment.

b) **National Legislation**

- 1.2.4 UK legislation does not specify the detailed content required for socio-economic assessments, or provide defined standards or thresholds for assessing the significance of effects. However, there are a number of important issues for this area addressed in legislation, policies and guidelines.

i. **Equality Act 2010**

- 1.2.5 The Equality Act 2010 (Ref. 1.1) imposed an “*Equality Duty*” on public bodies which came into force in April 2011. It sets out nine protected characteristics (age, disability, gender reassignment, marriage and civil partnership, race, religion or belief, sex and sexual orientation) and requires public bodies to have due regard to the need to:

- eliminate unlawful discrimination, harassment and victimisation;
- advance equality of opportunity between different groups; and
- foster good relations between different groups.

- 1.2.6 SZC Co. is not a public body. However, an **Equality Statement** (Doc Ref. 5.14) has been submitted with the DCO application. This **Equality Statement** is not part of the EIA, but nevertheless, SZC Co. considers it to be relevant to the application.

c) **National Policy**

- 1.2.7 The following national-scale policy sets the parameters and scope for the socio-economic assessment of the Sizewell C Project on its receptors.

i. **National Policy Statements**

- 1.2.8 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.2) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.3). NPS EN-1 and NPS EN-6 were considered by Parliament and formally

designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

1.2.9 The NPSs set out the Government’s energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants’ assessments of the effects of their scheme, and how the decision maker should consider these impacts. They include specific references to socio-economic effects.

1.2.10 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the national policy statements.

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
NPS EN-1 Paragraph 4.2.2.	<i>“To consider the potential effects, including benefits, of a proposal for a project, the IPC will find it helpful if the applicant sets out information on the likely significant social and economic effects of the development, and shows how any likely significant negative effects would be avoided or mitigated. This information could include matters such as employment, equality, community cohesion and well-being”.</i>	The socio-economic assessment provided in Volume 2, Chapter 9 of the ES has been developed in order to set out information on the likely significant social and economic effects of the development, and sets out how any likely significant negative effects would be avoided or mitigated. This includes effects on the labour market, housing market and public services, as well as on community cohesion. Additional information related to wellbeing is included in Volume 2, Chapter 28 , Health and Wellbeing.
NPS EN-1 Paragraph 4.2.6.	<i>“The IPC should consider how the accumulation of, and interrelationship between, effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place.”</i>	Where relevant, the socio-economic assessment provided in Volume 2, Chapter 9 of the ES inherently includes inter-relationship effects on receptors related to other environmental aspects.
NPS EN-1 Part 5.12 Paragraphs 5.12.1 – 5.12.5.	<i>“5.12.1 The construction, operation and decommissioning of energy infrastructure may have socio-economic impacts at local and regional levels. Parts 2 and 3 of this NPS set out some of the national level socio-economic impacts. 5.12.2 Where the project is likely to have</i>	These paragraphs of the NPS EN-1 set out the requirements for the applicant’s assessment which have been adhered to within Volume 2, Chapter 9 of the ES, Socio-economics . This includes: – Assessments at regional and local

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
	<p><i>socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES (see Section 4.2).</i></p> <p><i>5.12.3 This assessment should consider all relevant socio-economic impacts, which may include: the creation of jobs and training opportunities; the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; effects on tourism; the impact of a changing influx of workers during the different construction, operation and decommissioning phases on the energy infrastructure. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development; and, cumulative effects – if the development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region.</i></p> <p><i>5.12.4 Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.</i></p> <p><i>5.12.5 Socio-economic impacts may be linked to other impacts, for example the visual impact of a development is considered in Section 5.9 but may also have an impact on tourism and local businesses."</i></p>	<p>levels</p> <ul style="list-style-type: none"> Assessments related to: the creation of jobs and training opportunities; the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; effects on tourism; the impact of a changing influx of workers during the different construction and operation phases on the energy infrastructure; effects on social cohesion depending on how populations and service provision change as a result of the development; and cumulative effects. A review of existing baseline socio-economic characteristics, and regard to local policies where relevant.
NPS EN-1 Part 5.12	<p><i>"5.12.6 The IPC should have regard to the potential socio-economic impacts of new energy infrastructure identified by the</i></p>	<p>The assessment within Volume 2, Chapter 9 of the ES has regard to these paragraphs of the NPS EN-1 in</p>

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
Paragraphs 5.12.6 – 5.12.9.	<p><i>applicant and from any other sources that the IPC considers to be both relevant and important to its decision.</i></p> <p><i>5.12.7 The IPC may conclude that limited weight is to be given to assertions of socio-economic impacts that are not supported by evidence (particularly in view of the need for energy infrastructure as set out in this NPS).</i></p> <p><i>5.12.8 The IPC should consider any relevant positive provisions the developer has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts.</i></p> <p><i>5.12.9 The IPC should consider whether mitigation measures are necessary to mitigate any adverse socio-economic impacts of the development. For example, high quality design can improve the visual and environmental experience for visitors and the local community alike.”</i></p>	<p>terms of:</p> <ul style="list-style-type: none"> – Its approach to evidence-based effects (as opposed to assertion); – The promotion or enhancement of positive aspects of the Sizewell C Project – for example jobs and skills creation; – Its approach to designing effective mitigation to mitigate potential adverse significant effects.
NPS EN-6 Paragraphs 3.11.3 and 3.11.4.	<p><i>“3.11.3 Through the EIA, and in accordance with Section 5.12 of EN-1, the applicant should identify at local and regional levels any socio-economic impacts associated with the construction, operation and decommissioning of the proposed new nuclear power station.</i></p> <p><i>3.11.4 This assessment should demonstrate that the applicant has taken account of, amongst other things, potential pressures on local and regional resources, demographic change and economic benefits.”</i></p>	<p>These paragraphs of the NPS EN-6 set out the requirements for the applicant's assessment which have been adhered to within Volume 2, Chapter 9, Socio-economics. This includes potential pressures on local and regional resources, demographic change and economic benefits.</p>

ii. Appraisal of Sustainability of the Nuclear NPS (October 2010)

- 1.2.11** The Appraisal of Sustainability (AoS) for NPS EN-6 (Ref. 1.4) sets out what the construction of new nationally significant energy infrastructure, in accordance with the requirements of the new policy regime, is expected to mean for the environment, society and the economy.
- 1.2.12** SZC Co.'s assessment of potential significant effects on socio-economic receptors has had regard to the potential effects identified in the AoS, which

informed the 2019 **EIA Scoping Report**, provided in **Appendix 6A** of this volume, and subsequently the content of the assessment. In particular, the assessment set out in **Volume 2, Chapter 9** of the **ES** has regard to the conclusions of the AoS set out in the following paragraphs:

1.2.13 The AoS, provided at Table S.4.1 of NPS EN-6 (Ref. 1.4), has three objectives identified under the theme “*Communities – population, employment, and viability*”. These are:

- to create employment opportunities;
- to encourage the development of sustainable communities; and
- to avoid adverse impacts on property and land values and avoid planning blight.

1.2.14 Paragraphs S.11.8 to S.11.10 of NPS EN-6 identify the potential for significant beneficial effects on employment and the economy at the local and regional level during the construction phase and also economic benefits in the operational phase. It identifies possible short-term adverse effects on local labour supply, and local communities and demand for public services from incoming workers although it is noted that these can be mitigated. It concludes in paragraph S.10.10 that “*Overall the revised AoS found that there are likely to be significant beneficial effects on employment and viability for communities*”.

1.2.15 In relation to the potentially suitable site at Sizewell, the AoS of NPS EN-6 concluded the potential likely effects and findings recommended for the decision maker to consider include:

- “*The operation of a new nuclear power station at Sizewell is likely to have significant beneficial effects for employment, the economy and communities at a local scale, with the magnitude of these effects reduced at a regional and national scale (Paragraph 5.23);*
- *There is potential for short-term adverse effects on local communities due to in-migration of workers to the area, especially during construction. This in-migration could bring pressure on basic services, housing and local traffic routes surrounding the site (Paragraph 5.24);*
- *A potential, though uncertain, effect of strategic (regional) impact may be the increased demand in construction labour, which could lead to a shortage of local construction workers to meet the needs of other industries. Such pressures would increase if the construction phase were to coincide with other major projects in the sub-region, for*

example, the decommissioning of the existing Sizewell A reactor (Paragraph 5.25);

- *Job losses from closure of the existing power station [Sizewell A] adjacent to the site are likely to be offset by labour demands from construction and operation of a new nuclear power station. However, the time lag between job losses and job creation and possible differences in skill requirements may require workers to seek temporary employment elsewhere (Paragraph 5.26);*
- *Increased labour demand within the region could lead to improved provision of education and training for the local population. Upskilling of employees and contractors associated with the new nuclear power station would also be beneficial to the region as a whole (Paragraph 5.27);*
- *Positive cumulative effects are also likely for Eastern England when considered with development of a second nuclear power station in the region. Together, these could contribute to the regional economy and employment with potential for a specialist nuclear industry hub. There may also be synergies with the wider energy sector, for example with the existing offshore oil and gas and the emerging renewable energy sector, based further up the coast at Lowestoft and Great Yarmouth (Paragraph 5.28);*
- *It is commonly perceived that proximity to a nuclear facility such as a power station would have an adverse effect on property values. However, the evidence for this is inconclusive and contradictory. A study of effects in America found that property values were actually increased in the vicinity of nuclear facilities, although the authors caution that this finding is subject to several caveats including being based on a small sample and may be unrepresentative. It is suggested that in relatively poor areas, or where the local economy is depressed, the income generated by employment at a new nuclear facility may have a positive effect on local property values. For the present appraisal, any effect on property values is not considered to be strategically significant because it is limited to the local area (Paragraph 5.29)."*

1.2.16 Paragraph 5.30 sets out a summary of potential effects on "Communities: Population, Employment and Viability".

- *"Beneficial effects at a regional scale may occur when the project is considered cumulatively with other energy projects in the East of England region. A potential adverse effect at a regional scale is the*

project leading to a shortage of local construction labour available to other industries”.

iii. National Planning Policy Framework 2019

1.2.17 The National Planning Policy Framework (NPPF) (Ref. 1.5) sets out the Government’s planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.18 Paragraph 8 sets out the three overarching objectives of the planning system (economic, social and environmental), which are interdependent and need to be pursued in mutually supportive ways (so opportunities can be taken to secure net gains across each of the different objectives). Two of the three objectives are relevant to this socio-economic assessment:

- an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure; and
- a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being.

1.2.19 Paragraph 80 states: *“Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future. This is particularly important where Britain can be a global leader in driving innovation, and in areas with high levels of productivity, which should be able to capitalise on their performance and potential.”*

iv. Industrial Strategy, building a Britain fit for the future (November, 2017)

1.2.20 The Government’s Industrial Strategy White Paper (Ref. 1.6) sets out a long-term plan that provides a policy framework against which major private and public sector investment decisions can be made with confidence.

- 1.2.21 It sets out how Government is “*building a Britain fit for the future – how we will help businesses create better, higher-paying jobs in every part of the UK with investment in the skills, industries and infrastructure of the future.*” (Page 12).
- 1.2.22 One of four economic “*Grand Challenges*” for the UK is “*maximising the advantages for UK industry from the global shift to clean growth*”. (Page 23).
- 1.2.23 The strategy highlights that “*the nuclear sector is integral to increasing productivity and driving growth across the county*” (Page 206).
- v. [Industrial Strategy Nuclear Sector Deal \(June 2018\)](#)
- 1.2.24 The Industrial Strategy Nuclear Sector Deal (Ref. 1.7) sets out the Government’s and industry’s shared vision for the UK nuclear sector.
- 1.2.25 It sets out the potential for the UK to capitalise on a domestic market worth an estimated £75bn and global markets estimated at £100bn (waste and decommissioning) and £1.2tn (new build) up to 2035 (Page 7). It includes targets to achieve up to £2bn domestic and international contract wins by 2030; to achieve a target of 40 percent of the workforce being women by 2030; to maximise apprenticeships and target 50 percent female participation in apprenticeships by 2021. It is expected the sector will support an estimated 100,000 well paid jobs throughout England, Scotland and Wales by 2021 (up from 87,000), many of which will be in more remote regions, providing significant local economic benefits.
- 1.2.26 The deal argues that investment in the sector has the potential to transform the prosperity of regions and communities, by providing high-value and skilled employment chances, unlocking investment to support infrastructure and capital projects and growing manufacturing and industrial capabilities. It identifies that there are opportunities to unlock investment; increase opportunities for local suppliers; develop skills strategies that embrace greater diversity and better opportunities for people across the country; and to develop nuclear supply chain clusters.
- 1.2.27 The deal makes the following commitments with respect to people and skills:
- the sector will work to maximise the use of the Apprenticeship Levy to enable the supply chain to increase the number of apprentices at a local level and ahead of demand;

- alongside Government investment in nuclear-related PhDs, employers will work with the Institute for Apprenticeships to develop a proposal or a Level 8 trailblazer standard for nuclear experts;
- the Government will work with the sector to enable bespoke programmes that support the transitioning and transfer of capability between sectors; and
- the sector and Government are committed to engaging with young people on nuclear careers, including through work experience placements across the sector for students in schools, further education and higher education; and by improving visibility in schools for careers in nuclear.

1.2.28 With respect to the business environment, the following commitments are set out:

- Support for national supply chain competitiveness and productivity improvements – which could include regional applications through a nuclear clusters development programme. The programme would look to offer targeted support to companies who want to expand their capabilities in nuclear or enter the sector from related markets. This is expected to support sector cost reduction targets by embedding new advanced manufacturing techniques and increase the UK's export capabilities (especially in areas of proven expertise like waste and decommissioning, where the global market opportunity is estimated to be £100bn up to 2035). The Nuclear Advanced Manufacturing Research Centre estimates that 12,500 jobs and £2bn in contracts would be supported by 2030.

1.2.29 In terms of places the following is set out:

- A recent study by the Nuclear Industry Association and Oxford Economics estimated each UK civil nuclear worker adds an average of £96,600 Gross Value Added (GVA) to the economy – providing potentially transformative benefits for productivity and wider investment in the supply chain, skills and infrastructure – thereby securing significant regional economic growth. Operational jobs in nuclear power plants provide jobs for life, and major business opportunities.

vi. [HM Government, Integrated Communities Strategy Green Paper \(March 2018\)](#)

1.2.30 The Government's Integrated Communities Strategy Green Paper (Ref. **Error! Reference source not found.**) sets out definitions of community

integration and potential reasons for division. It identifies that integration is not assimilation, and that integrated communities are: *“communities where people live, work, learn and socialise together, based on shared rights, responsibilities and opportunities – underpinned by a shared set of British values – tolerance, freedom and equality of opportunity – which have helped make Britain one of the most successful multi-faith, multi-ethnic societies in the world”*.

1.2.31

A number of target areas are identified that should be investigated by local government, business, voluntary and community sectors to ensure integrated communities. Whilst not policy, this is useful background context, and includes the following that are of relevance to the Sizewell C Project:

- leadership to drive integration – public authorities are required to include an equality objective outlining specific activity to promote integration. Priority policies and services will be reviewed to determine how they might best drive integration;
- support for migrants – review of impact of English language requirements on visas and provision of information for recent migrants to support integration;
- support for young people – promote meaningful social mixing including in schools;
- English language – improved provision of English language learning;
- residential segregation – promote residential integration through housing policies;
- economic opportunity – support segregated communities and economically inactive people to access employment opportunities (including apprenticeships);
- challenge practices that can hinder integration and equal rights – empower marginalised groups, support interfaith dialogue and deliver a Hate Crime Action Plan;
- learn what works in building integrated communities, and share that learning – involve local communities in decisions about social and economic regeneration – uniting people behind common interest and providing opportunities; and
- share space and facilities – support for shared community activities through culture and sport, and shared community spaces that can create a sense of place and foster local residents’ pride.

- 1.2.32 SZC Co. has considered the above elements of community sustainability in the assessment of effects on community cohesion in **Volume 2, Chapter 9** of the **ES**. In each case, the elements that contribute towards sustainable, integrated communities have been used to develop mitigation for potential and/or perceived effects on public services, community facilities, accommodation and community safety as a result of the Sizewell C Project.

d) **Regional Policy**

- 1.2.33 The following regional-scale policy sets the context for the socio-economic effects of the Sizewell C Project in terms of the wider economic benefits and effects on people and communities. The policies identified are those that are relevant to identifying the significant socio-economic effects.

i. **Local Industrial Strategy for Norfolk and Suffolk, New Anglia Local Enterprise Partnership (2019)**

- 1.2.34 New Anglia Local Enterprise Partnership's (NALEP) draft Local Industrial Strategy (2019) (Ref. 1.9) recognises the importance of the low carbon energy sector in general, and the Sizewell C Project in particular, to the future economic success of the area. Sizewell C will have an important role to play not only in the clean energy sector but also in a number of the underpinning sectors within the strategy such as manufacturing and construction.

- 1.2.35 The strategy sets out the case for energy sector skills initiatives, and the importance of building workforce transferability and allowing people to be more productive as they move through their careers in the energy sector. It also sets out an ambition to tackle underlying productivity and improve innovation through developing opportunities for businesses to scale up so that they are able to access contracting opportunities, raise productivity and wages and expand their market share

ii. **The East Norfolk and Suffolk Economic Strategy, NALEP (November 2017)**

- 1.2.36 NALEP's Economic Strategy (Ref. 1.10) sets out the area's (Norfolk and Suffolk) potential to deliver 88,000 new jobs, £17.5bn real growth, a higher proportion of people engaged in the labour market than across the UK, 30,000 new successful businesses, GVA per hour of £39, 66% of the population with National Vocational Qualification Level 3+ (NVQ3+), and increased median wages by £200 more per week by 2036.

- 1.2.37 The strategy states the area is ambitious for growth and will work with Government and private investors to deliver it, with a focus on high value,

highly skilled jobs and industries, and the provision of technical skills, access to innovative techniques and business support.

1.2.38 It sets out the following ambitions for Norfolk and Suffolk to be:

- *“The place where high growth businesses with aspirations choose to be, with excellent sites to locate, grow and innovate, with easy access to support and finance. This will drive business growth, jobs growth and GVA.”*
- *“An international facing economy with high value exports, where our sectors are producing and exporting more value-added goods and services, entering new global markets capitalising on new trade links to other economies. This will drive exports and GVA.”*
- *“A well-connected place, locally, nationally and internationally. Investment in housing, roads, rail and broadband is coordinated to build the communities and connections that people and businesses need. This will drive housing and GVA.”*
- *“An inclusive economy with a highly skilled workforce, where everyone benefits from economic growth and wage levels rise above the national average. Norfolk and Suffolk will continue to promote collaboration between business, Higher Education (HE), Further Education (FE), schools and the public sector to provide the training opportunities and work experience that enable businesses and people to fulfil their full potential. This will drive skills, employment rate and median wage.”*
- *“A centre for the UK’s clean energy sector, capitalising on the strength and diversity of the energy sector and supply chain, our strategic location, skills base and connectivity to other regions. This will drive GVA.”*
- *“A place with a clear, ambitious offer to the world, which showcases the strengths of Norfolk and Suffolk to the UK and beyond. Offering diverse, high quality and affordable housing where people want to live, with a strong vibrant culture and leisure offers and a clear sense of why people and business choose to live and work here. This will drive GVA, businesses and jobs growth.”*

1.2.39 With respect to driving business growth and productivity, NALEP will work to achieve three goals:

- increasing investment;

- driving productivity; and
- helping firms move into new markets and products.

1.2.40 To drive inclusion and skills, NALEP will:

- help young people set their ambitions high and understand the exciting local careers available to them;
- provide people with the information they need to make informed decisions on the skills, capabilities and opportunities they need to success;
- encourage businesses to invest in and providers to respond quickly to, the long-term needs of people and businesses; and
- design actions and investment so they enable growth that directly supports wider community benefits, including wellbeing, health and care.

1.2.41 To support the area's clean energy cluster (the only place in the UK where expertise and operations in oil, gas, nuclear, renewables, solar and micro generation exist in such close proximity), NALEP will:

- provide local people with routes to be involved and benefit as the cluster expands;
- develop new opportunities in the nuclear sector; and
- develop Norfolk and Suffolk as a centre for the UK's low carbon clean energy sector.

iii. Suffolk Growth Strategy, Suffolk County Council (SCC)

1.2.42 The Suffolk Growth Strategy (Ref. 1.11) defines the SCC's ambitions to strengthen the Suffolk economy: to create more, higher value, better-paying jobs, and more wealth. This will be achieved by building on the area's distinctive competitive economic and environmental advantages and driving green economic growth.

1.2.43 It sets out a vision for Suffolk in 2028, to have the best quality of life in Europe, with employment rates above the national average, low unemployment, more high-value jobs, less out commuting, and good local work prospects for young people. It sets a target economic growth rate of 2.5%, and size of £20bn per year, and targets to achieve GVA per head and average earnings comparable with the South East region. In terms of skills, it sets targets for 70% residents to be educated to advanced level

and over 40% to degree level, and for Suffolk firms to find it easy to find skilled employees from the local population, with high business start-up rates. The strategy aims to create an area that meets the expectations and aspirations of all.

1.2.44 Nine key sectors are identified with high potential for the growth of the Suffolk economy, including the following of relevance to the Sizewell C Project and supply chain:

- Energy;
- Advanced Manufacturing and Technology (AMT);
- Information and Communication Technology (ICT);
- Finance and Insurance;
- Food, Drink and Agriculture; and
- Tourism.

1.2.45 With respect to the growth of the energy sector, the strategy highlights the substantial employment opportunities associated with the Sizewell C Project.

1.2.46 It identifies a number of potential barriers to growth in the area (Suffolk):

- Suffolk's economic base is weighted towards lower value-added activities, with lower potential for growth which is reflected in lower productivity rates (GVA per head) compared to the national average. High value-added sectors remain a relatively small part of Suffolk's economy.
- Lower than average educational attainment and skills of the adult workforce.
- Fall in number of business starts.
- Transport connectivity and digital connectivity challenges.

1.2.47 Four main elements are set out in order to drive economic growth by enabling private investment:

- *“strengthening the skills of Suffolk's workforce and young people starting work;*
- *attracting inward investment and promoting enterprise;*

- *focusing investment in Suffolk’s principal economic growth locations; and*
- *improving transport, digital communications and other infrastructure.”*

1.2.48

Four objectives will drive the County’s ambitions in terms of skills:

- Growth through local skills leadership – creation of a new locally led skills system, where employers take a more central role, and skills investment is prioritised in sectors that will drive growth.
- Economic development driven by apprenticeships and higher education – significantly increasing the number of apprenticeships, targeting sectors including energy, manufacturing, engineering, construction, ICT, digital, advanced logistics, and finance.
- Raising the Bar – a Suffolk-wide initiative for growing ambitions and preparing school, college and university leavers for work.
- Tackling youth unemployment – through a mixture of work experience, internships and opportunities to re-engage in full-time learning, including a focus on NEETs (young people aged 16-24, Not in Education, Employment or Training).

1.2.49

Six objectives will drive the County’s inward investment and enterprise ambitions:

- securing inward investment – by both attracting foreign direct investment and working with companies already based in Suffolk to support their efforts to invest in expansion;
- enabling Suffolk companies to increase their exports to the rest of the world;
- accelerating business start-ups;
- supporting small businesses and encouraging innovation;
- increasing economic activity arising from public agency procurement; and
- improving business resource efficiency.

1.2.50

The plan identifies growth opportunities driven by the Sizewell C Project, including temporary construction employment opportunities, permanent employment opportunities once the Sizewell C Project is operational, and opportunities for associated economic activity including in research and

development. Opportunities are expected to be concentrated on-site, but will also create benefits further afield.

iv. [Transforming Suffolk, Suffolk's Community Strategy 2008-2028, Suffolk Strategic Partnership \(June 2008\)](#)

1.2.51 Suffolk's Community Strategy (Ref. 1.12) sets out measures to deliver improvements to the quality of life in Suffolk, for its people and its communities. By 2028, the strategy aims for Suffolk to be recognised for its outstanding environment and quality of life for all; a place where everyone can realise their potential, benefit from and contribute to Suffolk's economic prosperity, and be actively involved in their community.

1.2.52 It sets out four themes, three of which are relevant to this assessment:

- A prosperous and vibrant economy – which inspires and encourages people and communities to succeed. By 2028 targets to capture emerging markets, reduce economic inequalities across the County, and improve transport and infrastructure to support sustainable growth.
- Learning and skills for the future – a high quality, responsive education and training system that will enable each person to achieve their potential and bring prosperity to them, their families and communities. By 2028 targets to have a workforce with the skills opportunities to meet the needs of Suffolk's economy, and high aspirations and to realise them through quality learning opportunities.
- Safe, healthy and inclusive communities – where all people are safe, live healthy lifestyles, and are valued. By 2028, targets to reduce crime and fear of crime, safeguard communities, and support communities where people feel a sense of belonging and being valued.

1.2.53 A number of issues are identified that cut across all themes of the strategy, including the following of relevance to this assessment:

- affordable, quality housing for all;
- cohesive communities;
- access and opportunities for all; and
- increased participation in culture, sport and recreational activities.

e) **Local Policy**

- 1.2.54 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.
- 1.2.55 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.
- 1.2.56 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).
- 1.2.57 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.
- 1.2.58 This section also refers to other relevant local guidance and strategies.
- i. **Suffolk Coastal District Local Plan Core Strategy and Development Management Policies, Suffolk Coastal District Council (July 2013)**
- 1.2.59 SCDC's adopted Core Strategy (Ref. 1.13) sets out policies to guide development across the district, and to contribute to achieving the following priorities for the district that are of relevance to this assessment:
- develop a safe and healthy community with access to leisure opportunities;
 - support the economy; and
 - meet housing needs.
- 1.2.60 The Strategy also identifies a number of cross-cutting issues that are relevant to this assessment:
- young people;
 - older people;
 - equality and diversity; and

- access to services.
- 1.2.61 The overarching vision of Suffolk Coastal in 2027 is *“having built on the best of the past, Suffolk Coastal will be a district where people can and want to live and to invest, as well as to care for others and the environment”*.
- 1.2.62 With respect to housing and the economy, the Core Strategy’s vision is that:
 - The district’s economy will be diverse in its range, continuing to support a large number of small and medium sized businesses, but will be amongst the national leaders in terms of those economic sectors vital to a post-recession UK economy, including the low carbon economy.
 - The importance of tourism will have increased.
 - The value of the district’s economy to the wider national economic objectives will have been realised and with it investment secured in the range of infrastructure necessary to support and maintain it.
 - Enterprise will continue to be encouraged in rural areas and market towns.
 - To support this strong and diverse economy will be a workforce that possesses appropriate skills for employment in these growth sectors, but also for the locally oriented economy. Suitable training and employment opportunities will exist. There will no longer be the need for a disproportionate number of educated young people to leave the district to find work or further education. There will also be adequate opportunity for young people in the lower skills bracket to find work and develop the right skills and qualifications to secure work locally. To fill initial skill shortages and to bridge skill gaps as key sectors of the economy develop and expand, the local workforce will have been bolstered by skilled workers from outside of the district.
- 1.2.63 With regard to community well-being, the strategy’s vision is that:
 - One of the roles of the strategy will have been to ensure that the necessary infrastructure, services and facilities required to support the new development it promotes has been provided in a timely manner. Communities will be cohesive and inclusive. The incidences of poverty will have reduced through improved opportunities in education, jobs, healthcare, and access to decent homes.
- 1.2.64 The following strategic policies are of relevance to this assessment:

- Strategic Policy SP1 – Sustainable Development.
- Strategic Policy SP7 – Economic Development in the Rural Areas.
- Strategic Policy SP8 – Tourism.
- Strategic Policy SP13 – Nuclear Energy.
- Strategic Policy SP16 – Sport and Play.
- Strategic Policy SP24 – Leiston.

1.2.65 The following development management policies are of relevance to this assessment:

- Development Management Policy DM17 – Touring Caravan, Camper Vans and Camping Sites.
- Development Management Policy DM18 – Static Holiday Caravans, Cabins and Chalets.
- Development Management Policy DM32 – Sport and Play.

ii. [Suffolk Coastal Final Draft Local Plan \(January 2019\)](#)

1.2.66 The Suffolk Coastal Final Draft Local Plan (Ref. 1.14) was submitted for examination in March 2019. The following policies are of relevance to this assessment:

- Policy SCLP3.1: Strategy for Growth in Suffolk Coastal District. The council will deliver an ambitious plan for growth over the period 2018 – 2036 in Suffolk Coastal, including by supporting economic growth to deliver at least 6,500 jobs and to enable the key economic activities to maintain and enhance their role within the UK economy.
- Policy SCLP3.4: Proposals for Major Infrastructure Projects. Policy requirements include the need to mitigate the impacts arising from major infrastructure projects, considered against policy requirements including: Appropriate packages of local community benefit to be provided by the developer to offset and compensate the burden and disturbance experienced by the local community for hosting major infrastructure projects; Community safety and cohesion impacts; Requirement for a robust Environmental Impact Assessment; The development and associated infrastructure proposals are to deliver positive outcomes for the local community and surrounding environment; Economic and community benefits where feasible are

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maximised through agreement of strategies in relation to employment, education and training opportunities for the local community; Cumulative impacts of projects are taken into account and do not cause significant adverse impacts; and appropriate monitoring measures during construction, operating and decommissioning phases to ensure mitigation measures remain relevant and effective.

- Policy SCLP3.5 Infrastructure Provision. Developers must consider the infrastructure requirements needed to support and service the proposed development. All development will be expected to contribute towards infrastructure provision to meet the needs generated. Off-site infrastructure will generally be funded by the Community Infrastructure Levy (CIL). On-site infrastructure will generally be secured and funded through section 106 planning obligations. Development will be expected to contribute to the delivery and enhancement of infrastructure which encourages active lifestyles and healthy communities, through on-site provision, where appropriate, to the scale and nature of development and through CIL contributions. In locations, where there is inadequate school capacity within the local catchment, development should contribute to the expansion or other measures to increase places available at local schools.
- Policy SCLP4.2: New Employment Development. The council will support the delivery of new employment development to provide greater choice and economic opportunities in suitably located areas across the District.
- Policy SCLP4.5: Economic Development in Rural Areas. Proposals that grow and diversify the rural economy, particularly where this will secure employment locally, enable agricultural diversification and other land based rural businesses, will be supported.
- Policy SCLP5.16: Residential Caravans and Mobile Homes. As a residential use, the principal of development of permanent residential caravans and mobile homes will be considered under the relevant policies for housing.
- Policy SCLP6.1: Tourism. Proposals which improve the visitor experience and support opportunities for year-round tourism will be supported where increased tourism uses can be accommodated.
- Policy SCLP6.2: Tourism Destinations. The council will support proposals for tourism development that contribute to the broad appeal, accessibility and year-round nature of destinations across the district.

- Policy SCLP6.3: Tourism Development within the area of outstanding natural beauty (AONB) and Heritage Coast. Applicants are encouraged to engage with local communities and the Suffolk Coast and Heaths AONB Management Unit in evolving development proposals, with the aim of delivering development that takes an active role in the management of the local area. It will be supported where it meets a number of requirements, including enhancing the long-term sustainability of the area.
- Policy SCLP6.4: Tourism outside of the AONB will be supported where it meets a number of requirements, including enhancing the long-term sustainability of the area.
- Policy SCLP6.5: New Tourist Accommodation.
- Policy SCLP8.1: Community Facilities and Assets. Proposals for new community facilities and assets will be supported if the proposal meets the needs of the local community, is of a proportionate scale, well related to the settlement which it serves and would not adversely affect existing facilities that are easily accessible and available to the local community.

iii. [Suffolk Coastal District Council Leisure Strategy 2014-2024, Suffolk Coastal District Council.](#)

1.2.67 Suffolk Coastal District Council's Leisure Strategy (Ref. 1.15) aims to increase access and availability of leisure and recreation opportunities to the wider community, enhancing and communicating the current and future offer to meet the wants and needs of local communities over the next ten years. The action plan is separated into three sections; Sports, Facilities and Health and Wellbeing.

1.2.68 Leisure strategy recommendations include the following of relevance to this assessment:

Sport

- Support and implement the recommendations and actions of the Pitch, Non-Pitch and Built Facilities Assessments (Ref. 1.16).
- Encourage sports clubs and community groups to be more involved in the operation of facilities and sites.
- Introduce further sporting and physical activity opportunities for disabled and older residents.

Facilities

- Address the issues raised within the assessment of the council's ageing leisure assets and facilities.
- Support and implement the recommendations and actions of the Suffolk Coastal Leisure Needs Analysis and Pitch Non-Pitch, Open Spaces and Built Facilities Assessments.
- Where possible increase the accessibility, usability and affordability of sites and facilities.
- Develop mechanisms to ensure new planning developments consider active travel routes and easy access for all to leisure facilities and open spaces.

iv. East Suffolk Means Business, East Suffolk Business Plan (2015-2023)

1.2.69 East Suffolk's Business Plan (Ref. 1.17) sets out a vision to *"maintain and sustainably improve the quality of life for everyone growing up in, living in, working in and visiting East Suffolk"*.

1.2.70 To enable this vision, a three pronged strategy is set out (enabling communities, economic growth and financial self-sufficiency). The following strategic aims are of relevance to this assessment:

- Enabling communities – improve services, build resilient communities and make life better for everyone.
- Economic growth – long-term economic growth and improved productivity, and a strong local economy. The proposed new Sizewell C nuclear power station is identified as a huge opportunity for growing the East Suffolk economy. ESC will continue to work closely with SZC Co. and a wide range of partners to maximise the economic benefit of this development, while minimising and managing any negative impact.

1.2.71 Specific actions planned for Suffolk Coastal include:

- Enhance and re-develop modern leisure centre and sports hub facilities in the district.
- Advocate on behalf of communities and local stakeholders to maximise the local economic, community and environmental benefits and opportunities from the Sizewell C development.

v. East Suffolk Economic Growth Plan, 2018-2023

1.2.72 The East Suffolk Economic Growth Plan (Ref. 1.18) expands on the strategic aims of the East Suffolk Business Plan with respect to achieving economic growth across East Suffolk. It aims to provide a clear and robust approach to facilitating growth.

1.2.73 The approach includes:

- maximising competitive advantage in key sectors such as energy, ICT, tourism and logistics; and
- investing in the foundations of a successful and growing economy such as transport and communications infrastructure, skills development and business support and finance to fully exploit the growth opportunities across East Suffolk in the coming years.

1.2.74 Three main priorities are:

- Priority 1: Supporting entrepreneurs and entrepreneurship in East Suffolk.
- Priority 2: Encouraging established businesses to invest and grow.
- Priority 3: Attracting inward investment to East Suffolk, focused around existing and emerging sectors and supply chains.

1.2.75 Sizewell is identified as a “key place” for growth.

1.2.76 The energy sector is identified as crucial for East Suffolk, and there are “huge possibilities” surrounding nuclear power, especially in relation to Sizewell C. ESC will support the energy sector, including by supporting the case for investment in Sizewell C, ensuring that this is linked to clear economic development outcomes, and learning from the experience of other similar ventures (e.g. Hinkley Point) in respect of supply chains, inward investment opportunities and issues relating to employment and skills. It will also support the operations of Sizewell B, particularly in relation to labour market and skills issues.

1.2.77 The plan sets out a number of economic objectives for the district:

- Productivity – increase productivity performance by 1.75% per annum between 2018 and 2023.
- Jobs – support jobs growth of 0.6% per annum over the next five years (excluding growth linked to Sizewell C).

- Business stock – grow (net) stock of enterprises by 2.0% per annum.

vi. [East Suffolk Tourism Strategy 2017-2022, East Suffolk Council](#)

1.2.78 East Suffolk District Council's Tourism Strategy (Ref. 1.19) sets out priorities, actions, impacts and outcomes relating to supporting a successful tourist sector in the area. The high level action areas identified will be achieved through a set of delivery plans which detail specific activity together with primary/lead organisations, delivery partners and funding sources.

1.2.79 The strategy aims to achieve the following outcomes:

- Attract and retain visitors.
- Support a resilient visitor economy that capitalises on the varied offer to visitors, sustains its value and increases the number of high value visitors and spend across all of East Suffolk.
- Visitor economy increases its contribution to GVA and economic well-being in East Suffolk, transforming businesses and their communities and delivering well paid, secure jobs.

vii. [East Suffolk Housing Strategy 2017-2023, East Suffolk Council](#)

1.2.80 East Suffolk's Housing Strategy (Ref. 1.20) sets out the council's priorities for housing for the six years 2017-2023. Overall its vision is to maintain and sustainably improve the quality of life for everyone growing up in, living in, working in and visiting East Suffolk.

1.2.81 It sets out five areas of focus, including the following of relevance to this assessment:

- *"Getting the Most out of Existing Homes and Improving Access to Housing – In an environment of high demand and pressures on housing supply the Council will provide support and help to prevent homelessness, ensure homes are allocated to those who need them most, and the best use is made of existing homes of all tenures."*

viii. [Waveney Local Plan, East Suffolk Council \(Adopted March 2019\)](#)

1.2.82 The Plan (Ref. 1.21) sets out the planning policies the council will use to determine planning applications in the geographic area of the former Waveney District Council boundary, over the period 2014-2026. As the site

is located outside of this spatial area, site specific spatial policies are not of relevance to this assessment. However relevant strategic policies include:

- Improve health, wellbeing and education opportunities for the population.
- Deliver new homes to meet the housing requirements of the whole community including those wishing to move into the area.
- Achieve sustained and resilient economic growth in towns and rural areas in order to support 5,000 new jobs.
- Support the growth of the tourist industry.
- Improve the quality and provision of all types of infrastructure.

1.2.83 Most new housing growth (56%) is expected to be concentrated in the north of the area (Lowestoft area), with smaller shares in Beccles and Worlingham (16%), rural areas (10%), Halesworth and Holton (8%), Bungay (6%) and Southwold and Reydon (4%).

ix. [Leiston Neighbourhood Plan 2015-2029, Leiston Neighbourhood Forum \(March 2017\)](#)

1.2.84 The Leiston Neighbourhood Plan (Ref. 1.22), prepared by the Leiston Neighbourhood Plan Group sets out a vision for the future of Leiston-cum-Sizewell Parish, and how the vision will be realised through planning and controlling land use and development change over the plan period 2015 to 2029.

1.2.85 The vision for Leiston includes the following objectives of relevance to this assessment:

- To recognise and work with the unique combination of circumstances that apply to the town, given the presence of the Sizewell nuclear facility.
- To work within the nuclear safeguarding limits to maintain the vibrancy of the town, with efforts being concentrated on retaining and improving the quality and range of facilities available to local residents and an improved physical environment.
- To retain, strengthen and expand its employment base, despite the detrimental effects of decommissioning Sizewell A.
- To accept and embrace an incremental improvement in its tourism offer, building on its location and its industrial heritage.

1.2.86 Objectives of the Neighbourhood Plan include the following:

- *“Objective One: Contribute to the Core Strategy district-wide housing requirement and provide for the housing needs of the parish.”*
- *“Objective Three: Improve the community infrastructure of Leiston in order to provide more places for people, young and old, to undertake their leisure pursuits.”*
- *“Objective Six: Protect the existing business base of the town and ensure their needs are provided for as well as the needs of new businesses.”*

f) International Guidance

i. Inter-organisational Committee on Guidelines and Principles for Social Impact Assessment

1.2.87 While there is no statutory guidance which sets out either scope or standards for socio-economic assessments, there is a growing literature on appropriate standards and thresholds. Some international guidance is provided by the Inter-organisational Committee on Guidelines and Principles for Social Impact Assessment (1994) (Ref. 1.23), with more recent academic updates. The Inter-organisational Committee on Guidelines and Principles for Social Impact Assessment defines social impacts as:

“the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organise to meet their needs, and generally cope as members of society.”

g) National Guidance

i. Department of the Environment (1989) Environmental Assessment: A Guide to the Procedures, London: HMSO

1.2.88 Early guidance from the UK Government suggested that *“certain aspects of a project including numbers employed and where they will come from should be considered within an environmental statement”* (Ref. 1.24).

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES** (Doc Ref. 6.2).

1.3.2 This section provides a summary of the socio-economic assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project.

1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.

1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation and Engagement

1.3.5 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process.

1.3.6 The **Consultation Report** (Doc Ref. 5.1) describes the full process which SZC Co. has gone through which includes the process for infrastructure planning applications as set out in primary and secondary legislation, including meetings held with ESC (formerly SCDC and WDC) and SCC throughout the EIA process to discuss the scope of the assessment.

1.3.7 The **Consultation Report** also sets out a summary of key issues raised by individuals, statutory bodies and other organisations, and includes a socio-economic section, cross referenced with **Volume 2, Chapter 9** of the **ES** (Doc Ref. 6.3) and the appended Technical Notes **Appendix 9A** to **Appendix 9E**.

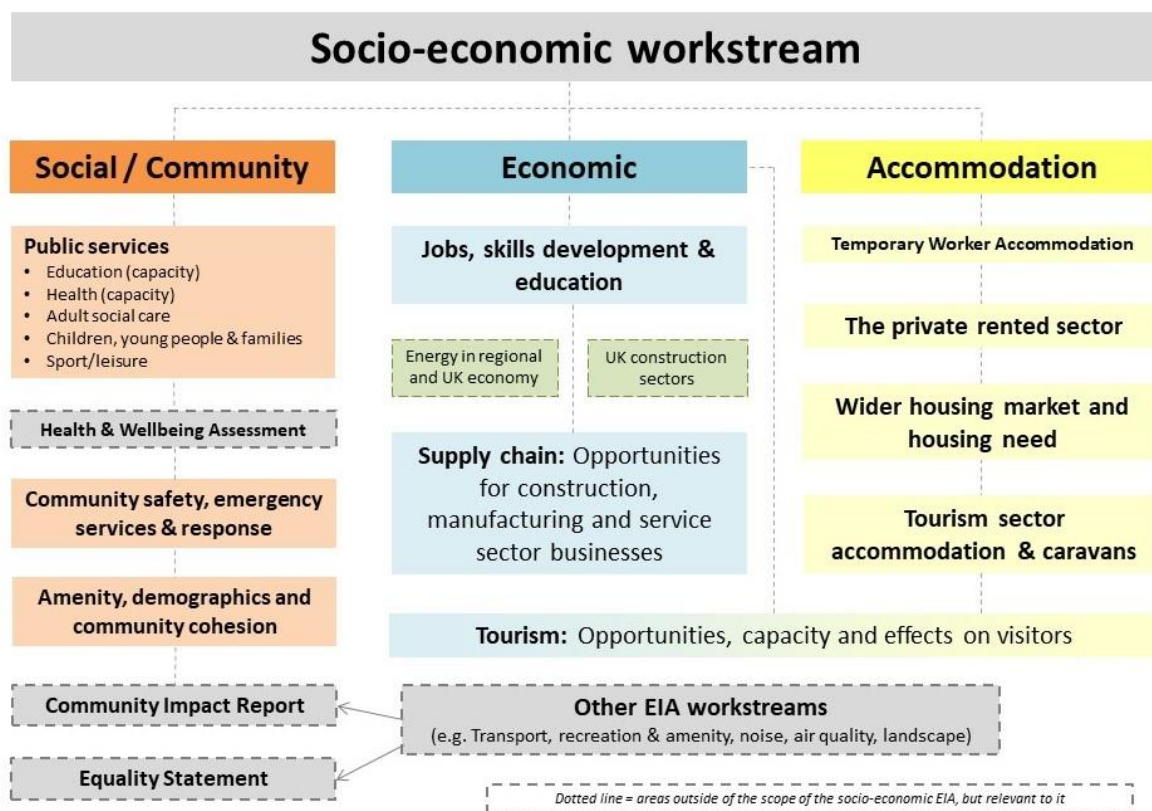
1.3.8 In addition, a set of initial workshops were held with local authorities and other key stakeholders to identify the likely socio-economic impacts associated with the Sizewell C Project, and to identify possible measures to mitigate these impacts. A series of formal socio-economic working groups, incorporating representatives from ESC (formerly SCDC) and SCC, and SZC Co. were established from 2013. The working groups have considered the Sizewell C Project assumptions and methodology adopted for the

assessment, the approach to assessing effects and identifying critical issues, and the development of analysis leading to mitigation.

1.3.9

Plate 1.1 sets out the approach to disaggregation of issues within the wider socio-economic workstream, which has influenced the working groups' membership and scope – some elements are external to the scope of the Socio-economics chapter of the EIA, but are directly relevant to it, e.g. **Volume 2, Chapter 28** of the **ES**, Health and Wellbeing; the **Community Impact Report** (Doc Ref 5.13) and other technical EIA workstreams.

Plate 1.1: Disaggregation of the socio-economic workstream.



1.3.10

A series of Technical Notes were prepared as part of this engagement and formal consultation process and these are appended to **Volume 2, Chapter 9** of the **ES**. The methodology, baseline and development of the Sizewell C Project assumptions is summarised in the following bullet points:

- Volume 2, Appendix 9A** – Technical Note 1: Workforce Profile – this note sets out how the workforce is anticipated to change throughout the Sizewell C Project in terms of its size, components (e.g. skill levels) and the extent to which the workforce is home-based or non-

home-based. It is based on information from Hinkley Point C, Sizewell B and other projects, as well as early contractor involvement.

- **Volume 2, Appendix 9B** – Technical Note 2: Demographic Benchmarks and Workforce Characteristics – this note sets out the anticipated demographic profile and other population characteristics of the workforce, based on 2011 Census data and other research from national industry bodies.
- **Volume 2, Appendix 9C** – Technical Note 3: Spatial Distribution of the Workforce – this note describes how the workforce is anticipated to distribute geographically at the peak of construction activity, drawing on information from other Technical Notes in this list, and the Gravity Model (a ‘distance decay’ model based on workers’ propensity to travel to work, informed by value of time estimates and the location of available accommodation).
- **Volume 2, Appendix 9D** – Technical Note 4: Accommodation Datasets and Assumptions – this note sets out the Sizewell C Project’s assumptions about which accommodation sectors the non-home-based workforce is likely to live in, based on ‘demand’ and ‘supply’ aspects using research and public datasets, and experience from other projects.
- **Volume 2, Appendix 9E** – Technical Note 5: Leisure Audit and Estimated Demand – this note sets out the baseline for sport and leisure provision across the study area, and describes the methodology and assessment for potential temporary demand for facilities from the non-home-based workforce, using guidance and methodology from Sport England.

c) Study area

- 1.3.11 The spatial extent of the study area includes the main development site, all off-site associated development sites and the surrounding area as well as administrative geography defined by each socio-economic topic.
- 1.3.12 The precise areas used are partly influenced by data availability and in some cases also reflect the boundaries of relevant service planning areas.
- 1.3.13 The spatial scope of the socio-economic baseline studies therefore varies by impact category.

i. Administrative geography

1.3.14 Administrative geography is the primary scale at which baseline data from public datasets can be collected – this includes (from smallest/most local to largest/widest):

- Output Areas, Super Output Areas and Wards – used to define local areas where effects may occur at a sub-local authority scale such as localised housing or population changes.
- Where relevant, and data is available, the five-ward area local to the main development site has been considered (Leiston, Saxmundham, Snape, Yoxford, Aldeburgh wards). Where relevant, the assessment also considers the characteristics of individual wards and the smaller administrative geographies that they comprise – such as Lower and Mid-Level Super Output Areas (LSOAs and MSOAs) and Output Areas.
- District and county level – these areas form the basis of the assessment of impacts on the local labour market (wider economic impacts), housing market and public services.
- Regional level – this area forms the basis of sub-national economic and labour market effects in particular.
- National level – depending on the dataset, this could refer to United Kingdom, Great Britain or England, and is used to demonstrate the scale of effects, benchmarks or changes from a wider average.

ii. Workforce Effects

1.3.15 Socio-economic effects are primarily related to the size, characteristics and distribution of the construction workforce, and whether that workforce is home-based or non-home-based. As such, there are two ward-based assessment scales used in this assessment. These are based on the Gravity Model, which broadly includes inputs from the socio-economic assessments on the workforce profile, skills profile of the resident workforce, and accommodation location and availability. It then, based on travel times, allocates the expected distribution of the construction workforce across defined travel areas:

- 60-minute travel time: this is a collection of wards within a defined 60-minute travel distance from the main development site, including wards in Suffolk and Norfolk counties (East Suffolk, Mid Suffolk, South Norfolk, Broadland, Great Yarmouth, Ipswich, Babergh and Tendring

districts). It represents the estimated extent of daily travel to the construction site by non-home-based workers.

- Construction Daily Commuting Zone (CDCZ): this is defined as the wards within an approximate 90-minute commute time of the main development site. This area includes almost all of Suffolk (excluding a small area to the south of St Edmundsbury and Forest Heath districts), much of Norfolk (including South Norfolk, Great Yarmouth, Norwich, most of Broadland, and areas of Breckland and North Norfolk districts) and north Essex (including Tendring, most of Colchester, and areas of Braintree and Maldon districts). The CDCZ is used primarily to define the local (home-based) labour market for the construction phase. The definition of the CDCZ involves consideration of a range of factors which affect workers' willingness to commute, including time, distance and travel allowances; plus findings from other studies of the mobility of UK construction workers.

1.3.16 Where possible, data for the CDCZ is presented based on ward level data, however for some more recent and wider datasets local authority rather than ward level boundaries are used (East Suffolk, Mid Suffolk, St Edmundsbury, Babergh, Forest Heath, Ipswich, Norwich, South Norfolk, Broadland, Great Yarmouth, Kings Lynn and West Norfolk, North Norfolk, Breckland, Tendring, Maldon, Colchester, Braintree, and East Cambridgeshire).

1.3.17 A full description of detailed inputs to the determination of the 60-minute travel distance and CDCZ is included in **Volume 2, Appendix 9A** of the **ES** – Technical Note 1: Workforce Profile, with specific elements covered in **Volume 2, Appendix 9D** of the **ES** – Technical Note 4: Accommodation Datasets and Assumptions and **Volume 2, Appendix 9C** of the **ES** – Technical Note 3: Spatial Distribution of the Workforce and the **Transport Assessment** (Doc. Ref. 8.5).

iii. Accommodation Study Areas

1.3.18 Accommodation data is generally produced across all administrative geographies, though more recent and different datasets are available at a local authority scale.

1.3.19 Generally, accommodation effects are relevant to the local authority (district) scale as this is the level at which housing services and support for housing vulnerability is statutorily provided.

1.3.20 Accommodation effects are also influenced by the distribution of the workforce across the 60-minute travel time area which allows for some

analysis at local authority scale, and ward-based assessment of localised effects.

- 1.3.21 It is also relevant to have regard to other spatial scales including the Strategic Housing Market Area (SHMA). The NPPF requires local authorities to assess housing needs at this level, rather than at an individual local authority level, to ensure a sound needs assessment is provided. The SHMA areas within the 60-minute travel time are therefore relevant when considering the accommodation impacts of the Sizewell C Project. There are two SHMA areas within the 60-minute zone – Ipswich (including Ipswich and Babergh, Mid-Suffolk, and the former SCDC local authority areas) and Waveney (the former WDC local authority area) zones.

iv. Economic Study Areas

- 1.3.22 Economic data is generally produced across all administrative geographies, though more recent and different datasets are available at a local authority scale.
- 1.3.23 Generally, economic effects are relevant to wider scales as this is the level at which labour markets operate and at which business services, skills provision and education are planned for.
- 1.3.24 Economic effects are also influenced by the distribution of the workforce across the 60-minute travel time area (in terms of the economic effects of non-home-based workers) and the CDCZ (in terms of employment supported for home-based workers).
- 1.3.25 It is also relevant to consider potential effects with regard to other spatial scales such as the local enterprise partnership (LEP). NALEP is one of 38 LEPs across the country which are spatially defined partnerships between local authorities, public sector organisations and business. LEPs aim to lead economic growth and job creation. NALEP covers the two counties of Norfolk and Suffolk and sets economic objectives across this spatial area.

v. Public Services Study Areas

- 1.3.26 Public services are provided at different scales depending on the type of service. For this assessment, study areas include:
- district (ESC) scale – for the provision of local services including leisure and regulatory and environmental services;
 - county (SCC) – for the provision of local services including education and social services and some emergency service provision (e.g. Suffolk Constabulary and Suffolk Fire and Rescue Service); and

- region (East of England) – for the provision of ambulance services by the East of England Ambulance Service.

1.3.27 There are also local study areas depending on the organisation of services and reporting of public information, for example, neighbourhood policing areas which are generally groups of wards.

vi. [Other Relevant Study Areas](#)

1.3.28 It is also relevant to consider potential effects with regard to other spatial scales:

- Effects on tourism may be relevant to consider various scales depending on the nature of effects and the location of tourist sector accommodation and designations.
- Effects related to the operational workforce would be determined by the likely spatial distribution of the workforce, and the subsequent effect on the local and regional economies.

d) [Assessment approach](#)

1.3.29 The potential for significant socio-economic effects are primarily linked to the workforce profile which sets out the change in employment required as a result of construction activity across the duration of the construction phase.

1.3.30 The Sizewell C Project's transport and socio-economic effects are influenced by two core assumptions about the construction workforce:

- the number of workers required over time, by skill/role, and the extent to which they can be sourced from existing labour markets (home-based) or would temporarily move to the area (non-home-based); and
- the spatial distribution of workers (by accommodation type for non-home-based workers) across the area.

1.3.31 The first assumption is driven by the Workforce Profile, details of which are set out in **Volume 2, Appendix 9A** of the **ES**. This sets out that this assessment uses a workforce profile peaking at 7,900 workers – this is a precautionary approach to ensure that appropriate mitigation can be applied. The spatial distribution is driven by the gravity model provided in **Volume 2, Appendix 9C** of the **ES** and accommodation assumptions provided in **Volume 2, Appendix 9D** of the **ES**.

- 1.3.32 Throughout the socio-economics assessment, the effects are considered in terms of their influence on the significance of effects on the economy and labour market, accommodation and public services.
- 1.3.33 Assessments are generally made (where appropriate) at the peak of construction workforce demand, representing the potential greatest effect on e.g. demand for accommodation and public services.
- 1.3.34 However, it is recognised that some effects may occur at different stages of the construction phase, that mitigation may require a ‘lead-in’ time to ensure that it is effective, and that effects may be determined by the change in workforce over time compared to the components of the Sizewell C Project – such as project accommodation provision. As such, where appropriate, assessments are made in the context of annual change over the duration of the construction phase.
- 1.3.35 There will also be effects arising from the operational phase when construction is complete. These will last for the lifetime of the Sizewell C Project, and are assessed from this point.

e) **Assessment criteria**

- 1.3.36 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.
- 1.3.37 A summary of the assessment criteria used in the socio-economic assessment is presented in the following sub-sections.

i. **Value and Sensitivity**

- 1.3.38 The main sensitive receptors for the socio-economic assessment are the housing and labour markets, public services and communities at a number of spatial levels, as described in **Table 1.2**. It is not possible to ascribe a relative ‘value’ to each of these receptors as impacts could be felt at all spatial scales and are as significant to individuals and communities in a local area as they are at the regional scale.
- 1.3.39 The assessment methodology focuses therefore on the ‘sensitivity’ of each receptor, and, in particular on their ability to respond to change based on recent rates of change and turnover. The socio-economic environment is a dynamic and adaptive one with constant background change and turnover, for example people moving into and out of the area and changing jobs. This is a particular feature of the construction sector.

1.3.40 The baseline assessment identifies the extent of this background change and then, where possible, the scale of likely impacts has been benchmarked against this change.

ii. Magnitude and Significance

1.3.41 The significance levels therefore combine an assessment of the overall magnitude or scale of the impact, and compare this to the ability of each receptor to respond to change. Potential impacts have been considered in terms of permanent or temporary, adverse (negative) or beneficial (positive).

1.3.42 Some impacts cannot be quantitatively assessed; in such cases a qualitative assessment has been used. In addition, the magnitude of the impact does not necessarily correlate with the significance of an effect. The key influences on the determination of significance of an effect include:

- the magnitude of the potential impact;
- the geographical extent of the impact;
- the duration and reversibility of the impact;
- the capacity of the relevant area to absorb the impact; and
- recent rates of change in the locality.

1.3.43 Thus, for example, a significant effect would be likely to be: classified as major or moderate and be difficult to absorb in the relevant area. The sources of the effect may arise during construction and/or operational phases.

1.3.44 Due to the (up to) 12 year construction period for the Sizewell C Project the duration of many of the temporary impacts will be long-term, although their magnitude will vary over time depending on the level of workforce at any one time. The assessments focus on the peak of the construction period, being the point at which the workforce requirements on the main development site are greatest. This enables it to demonstrate the maximum scale of beneficial impacts and ensure mitigation measures meet the worst case for adverse impacts.

1.3.45 **Table 1.2** identifies those impacts where significance can be defined with reference to the baseline and quantitative indicators. Other qualitative assessments are based on professional judgement. They seek, as far as possible, to identify quantitative criteria as to the level of change in relation to the current capacity of the area (for example for schools and accommodation) or in the context of current annual rates of turnover and

change in population. This recognises the dynamic nature of the environment with which the Sizewell C Project will interact.

- 1.3.46 Following the classification of an effect as presented in **Table 1.2**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

Table 1.2: Approach to assessment of significance for socio-economic effects.

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
Economic Effects – Construction					
Home-based (HB) recruitment.	Adverse	No adverse effects are considered in terms of employment generation – all effects are considered to be beneficial in this regard (potential secondary effects on labour market churn and ‘displacement’ are also considered).			
	Beneficial	HB employment equivalent to >10% of existing construction employment.	HB employment equivalent to 5% to 10% of existing construction employment.	HB employment equivalent to <5% of existing construction employment.	HB employment equivalent to <1% of existing construction employment.
Effects on unemployment and economic inactivity.	Adverse	No adverse effects are considered in terms of the effects of the Sizewell C Project on unemployment and economic activity – all effects are considered to be beneficial in this regard.			
	Beneficial	HB workforce drawn from unemployment represents >5% of current registered unemployed.	HB workforce drawn from unemployment represents 3% to 5% of current registered unemployed.	HB workforce drawn from unemployment represents <3% of current registered unemployed.	No workforce drawn from current unemployment/economic inactivity.
Effects on labour market churn and ‘displacement’.	Adverse	Assessed qualitatively in the context of existing labour market churn in the construction sector.			
	Beneficial				
Business and supply chain.	Adverse	No adverse effects are considered in terms of the effects of the Sizewell C Project on business and the supply chain – all effects are considered to be beneficial in this regard.			
	Beneficial	Assessed qualitatively based on the potential for contract value to be secured.			
Wages/spending and additionality.	Adverse	No adverse effects are considered in terms of the effects of the Sizewell C Project on wages/spending and additionality – all effects are considered to be beneficial in this regard.			
	Beneficial	Assessed qualitatively based on the potential for net additional contribution to the economy of earning and expenditure.			

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
Effects on tourism economy.	Adverse	Assessed qualitatively based on the identification of potential perceived sensitivities to changes in visitor behaviour in the context of the existing visitor environment and characteristics of the Suffolk coast, and evidence of perceived effects versus observed effects elsewhere.			
	Beneficial				
Effects on agricultural economy.	Adverse	Agricultural land lost represents > 10% of agricultural land in Suffolk.	Agricultural land lost represents 5–10% of agricultural land in Suffolk.	Agricultural land lost represents 1–5% of agricultural land in Suffolk.	Agricultural land lost represents < 1% of agricultural land in Suffolk.
	Beneficial	Beneficial effects on the regional agricultural economy are not likely to arise as a result of the Sizewell C Project resulting in either no change or overall loss to the quantum of land in this sector, and have therefore not been considered in this assessment.			
Effects of transport on business.	Adverse	Assessed qualitatively based on a review of overall effects of the Sizewell C Project on the transport network, and the ability for potentially affected businesses to claim statutory compensation should they perceive they qualify for it.			
	Beneficial				
Accommodation Effects – Construction					
Tourist Sector.	Adverse	Workforce demand exceeds 50% of available and affordable capacity at peak season.	Workforce demand exceeds 25% of available and affordable capacity at peak season.	Workforce demand exceeds 10% of available and affordable capacity at peak season.	Workforce demand is less than 10% of available and affordable capacity at peak season.
	Beneficial	Beneficial effects may occur where construction workforce has the potential to use otherwise vacant accommodation, particularly in off—peak seasons. This has been considered qualitatively, as it is likely to fluctuate between seasons, and is considered at the 60-minute area scale only.			
Private Rented Sector (PRS).	Adverse	Workforce demand exceeds 20% of overall stock or 100% of frictional vacancy needed for PRS to operate.	Workforce exceeds 10% of overall stock or 50% of frictional vacancy needed for PRS to operate.	Workforce demand is less than 50% of frictional vacancy needed for PRS to operate.	Workforce demand is less than 10% frictional vacancy needed for PRS to operate.

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
	Beneficial	Beneficial effects on the PRS are not considered in this assessment. The Sizewell C Project only has the potential to cause adverse effects due to the nature of demand for private rented accommodation. However, there may be long-term beneficial effects associated with mitigation strategies that leave legacy benefits in terms of the overall supply and quality of accommodation in the sector.			
Owner-occupied sector.	Adverse	> 50% of annual turnover of owner-occupied sector.	25–50% of annual turnover of owner-occupied sector.	10–25% of annual turnover of owner-occupied sector.	> 10% of annual turnover of owner-occupied sector.
	Beneficial	Beneficial effects on the owner-occupied sector are not considered in this assessment, as the Sizewell C Project only has the potential to cause adverse effects due to the nature of demand for owner occupied accommodation.			
Population Dynamics – Construction					
Population change and dynamics.	N/A	Effect of new non-home-based (NHB) workers represents >50% of annual average new residents.	Effect of new NHB workers represents 20 to up to 50% of annual average new residents.	Effect of new NHB workers represents 10 to up to 20% of annual average new residents.	Effect of new NHB workers represents less than 10% of annual average new residents.
Public Services – Construction					
Childcare and education.	Adverse	Effect of new population if additional means exceeding current capacity, where baseline levels were not already at or exceeding capacity.	Effect of new population if additional takes surplus capacity to within 5% of total capacity, or exceeds existing capacity by between 5% and 10% where baseline levels were already at or exceeding	Effect of new population if additional takes surplus capacity to within 10% of total capacity, or exceeds existing capacity by up to 5% where baseline levels were already at or exceeding capacity.	Effect of new population if additional means no change to within 10% of surplus capacity, or no change from baseline significance.

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
			capacity.		
	Beneficial	Beneficial effects on the childcare and education sector are not likely to occur as a result of the Sizewell C Project, which will not lead to an alleviation of need for these services as a result of physical interventions or implementation strategies, and have therefore not been identified in this assessment.			
Social services.	Adverse	Assessed qualitatively – drawing on information from scheme design and implementation strategies such as the Community Safety Management Plan (CSMP) (Doc Ref. 8.16), Worker Code of Conduct (Doc Ref. 8.16), Employment, Skills and Education Strategy (Doc Ref. 8.9) and Accommodation Strategy (Doc Ref. 8.10) supplemented by review of potential risks/issues identified through engagement related to project-wide effects.			
	Beneficial	Beneficial effects on the social care sector are not likely to occur as a result of the Sizewell C Project, which will not lead to an alleviation of need for these services as a result of physical interventions or implementation strategies, and have therefore not been identified in this assessment.			
Other county-level services.	Adverse	Assessed qualitatively based on the potential for NHB construction workers to create net additional demand for services in the context of their demographic characteristics, accommodation choices, locations and duration of residence.			
	Beneficial	Beneficial effects on other county level services are not likely to occur as a result of the Sizewell C Project, which will not lead to an alleviation of need for these services as a result of physical interventions or implementation strategies, and have therefore not been identified in this assessment.			
Formal sports and leisure.	Adverse	Unmet demand for additional formal sports and leisure facilities as a result of the construction workforce equivalent to whole facilities being needed, or a contribution to new facilities (considered qualitatively, informed by published standards of demand).			No, or imperceptible impact on demand for or supply of formal sports and leisure provision.
	Beneficial	Delivery of sports facilities that both meet the needs of workers and provide additional community resource in an area or sector of existing	Delivery of sports facilities that both meet the needs of workers and provide additional community resource.	Delivery of sports facilities that meet the needs of workers and help to attract a high-quality workforce.	No, or imperceptible impact on demand for or supply of formal sports and leisure provision.

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
		deficiency.			
Regulatory and environmental services.	Adverse	Proportion of NHB workforce in non-council-tax accommodation represents >10% increase in population at District level.	Proportion of NHB workforce in non-council-tax accommodation represents 5% to 10% increase in population at District level.	Proportion of NHB workforce in non-council-tax accommodation represents 2% to 5% increase in population at District level.	Proportion of NHB workforce in non-council-tax accommodation represents <2% increase in population at District level.
	Beneficial	Beneficial effects on regulatory and environmental services are not likely to occur as a result of the Sizewell C Project, which will not lead to an alleviation of need for these services as a result of physical interventions or implementation strategies, and have therefore not been identified in this assessment.			
Crime and policing.	Adverse	Potential estimated increase of more than 20% in crime rates per 1,000 population.	Potential estimated increase of between 10% and 20% in crime rates per 1,000 population.	Potential estimated increase of between 1% and 10% in crime rates per 1,000 population.	Potential estimated increase of up to 1% in crime rates per 1,000 population.
	Beneficial	Assessed qualitatively – drawing on information from scheme design and implementation strategies such as the CSMP (Doc Ref. 8.16), supplemented by review of potential risks/issues identified through engagement related to project-wide effects.			
Fire service.	Adverse	Assessed qualitatively – drawing on information from Transport Assessment (Doc Ref. 8.5) and scheme design and implementation, supplemented by review of potential risks/issues identified through engagement related to project-wide effects.			
	Beneficial	Assessed qualitatively – drawing on information from Transport Assessment (Doc Ref. 8.5) and scheme design and implementation that could improve service provision in the long-term.			
Community cohesion and	Adverse	Assessed qualitatively using national government definitions of community cohesion, integration and sustainability.			

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
integration.	Beneficial				
Operational Effects					
Local direct employment.	Adverse	No adverse effects are considered in terms of employment generation – all effects are considered to be beneficial in this regard.			
	Beneficial	Employment equivalent to >20% of existing employment in energy generation sector.	Employment equivalent to 10% to 20% of existing employment in energy generation sector.	Employment equivalent to 1% to 10% of existing employment in energy generation sector.	Employment equivalent to <1% of existing employment in energy generation sector.
Local indirect employment/economic effects.	Adverse	No adverse effects are considered in terms of local indirect employment generation and economic effects – all effects are considered to be beneficial in this regard.			
	Beneficial	Assessed qualitatively based on the potential for net additional contribution to the economy of earning and expenditure.			
Business and supply chain.	Adverse	No adverse effects are considered in terms of business and supply chain effects – all effects are considered to be beneficial in this regard.			
	Beneficial	Assessed qualitatively based on the potential for contract value to be secured locally.			
Private Rented Sector (PRS).	Adverse	Workforce demand exceeds 20% of overall stock or 100% of frictional vacancy needed for PRS to operate.	Workforce exceeds 10% of overall stock or 50% of frictional vacancy needed for PRS to operate.	Workforce demand is less than 50% of frictional vacancy needed for PRS to operate.	Workforce demand is less than 10% frictional vacancy needed for PRS to operate.
	Beneficial	Beneficial effects on the PRS are not considered in this assessment. The Sizewell C Project only has the potential to cause adverse effects due to the nature of demand for private rented accommodation during the operational phase.			
Owner-occupied sector.	Adverse	> 50% of annual	25–50% of annual	10–25% of annual	> 10% of annual turnover of owner-occupied

NOT PROTECTIVELY MARKED

Impact	Beneficial/Adverse	Major	Moderate	Minor	Negligible
		turnover of owner-occupied sector.	turnover of owner-occupied sector.	turnover of owner-occupied sector.	sector.
	Beneficial	Beneficial effects on the owner-occupied sector are not considered in this assessment, as the Sizewell C Project only has the potential to cause adverse effects due to the nature of demand for owner occupied accommodation.			
Net additional demand for public services.	Adverse	Assessed qualitatively considering the net additionality of operational workforce and their contribution to service delivery through general taxation.			
	Beneficial	Beneficial effects on public services are not likely to occur as a result of the Sizewell C Project, which will not lead to an alleviation of need for these services as a result of physical interventions or implementation strategies, and have therefore not been identified in this assessment.			
Population change, community cohesion and integration.	Adverse	Assessed qualitatively using national government definitions of community cohesion, integration and sustainability, and considering the annual rate of additional residents as a result of the NHB portion of the operational workforce.			
	Beneficial				

f) Assessment methodology

i. Establishing the baseline

Existing baseline

1.3.47 Baseline information has been identified through:

- Analysis of publicly-available demographic datasets including analysis of nationally recognised data and survey information obtained from the Office of National Statistics (ONS) and other Government departments including the (former) Department of Communities and Local Government (DCLG) – now the Ministry of Housing, Communities and Local Government. This includes ONS 2011 Census data and mid-year population estimates (Ref. 1.25), UK Business Register and Employment Survey (BRES) data (Ref. 1.26), Department for Work and Pensions Jobseekers Allowance Claimant Count data (Ref. 1.27), and the Government's Indices of Multiple Deprivation (2015) (Ref. 1.28).
- Work undertaken through various accompanying Technical Notes provided as **Appendices 9A to 9E** of **Volume 2** of the **ES**.
- Work on the transport gravity model which has been used to assess the spatial distribution of the workforce was undertaken jointly by the socio-economic and transport workstreams. A full description of the model and its inputs is set out in the **Transport Assessment** (Doc Ref 8.5).
- Consultation with appropriate statutory bodies and stakeholders.
- A study of local education facilities has been undertaken using pupil place planning documents (various) and Annual Schools Census data (Ref. 1.29).

Future baseline

1.3.48 The future baseline for socio-economic assessment considers the potential for:

- population and household change – as forecast by published population models for the East of England (these do not include the effects of Sizewell C, but do include general background growth in terms of housing development, household formation rates, and projected changes in migration rates). This includes a breakdown by age;

- employment projections by sector based on the East of England Forecasting Model (EEFM) (Ref. 1.30) throughout the construction phase and the early years of operation for the Sizewell C Project; and
- national and regional skills and training forecasts, published by the Construction Industry Training Board (CITB), setting out the potential for demand for construction skills up to 2023 (the furthest that CITB project) (Ref. 1.31);

1.3.49 Local authority planning for community facilities and public services (for example school places and other community infrastructure) is included in the overall baseline section of **Volume 2, Chapter 9** of the **ES**, Socio-economics.

ii. Construction

1.3.50 The socio-economic construction phase effects of the Sizewell C Project result from the workforce required to build Sizewell C and the demand for goods and services to support the development.

1.3.51 The assessment applies project assumptions provided in **section 1.3g)** below to assess the effects of the proposals against the policy, baseline and significance criteria described above in relation to the following topics:

- Economic effects including labour market effects, business and supply chain effects, wages/spending and additionality, and effects on the tourism and agricultural economies.
- Accommodation effects.
- Population and demographics.
- Public services/community facilities including education and pre-school; social services; formal sport and leisure; and regulatory and environmental services.
- Community safety and emergency services.
- Community cohesion and integration.

1.3.52 The potential for significant socio-economic effects in the construction phase is primarily linked to the workforce profile which sets out the change in employment required as a result of construction activity across the duration of the construction phase.

1.3.53 As explained above, assessments are presented, where appropriate at the peak of construction workforce demand, representing the potential

reasonable worst case effect on, for example, demand for accommodation and public services.

1.3.54 As also set out above, it is recognised that some effects may occur at different stages of the construction phase, that mitigation may require a lead-in time to ensure that it is effective, and that effects may be determined by the change in workforce over time compared to the components of the Sizewell C Project, such as project accommodation provision. As such, where appropriate, assessments are made in the context of annual change over the duration of the construction phase.

1.3.55 As explained above, there would also be effects during the operational phase when construction is complete, for the lifetime of the Sizewell C Project.

1.3.56 The EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments consider broadly the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.57 For some potential impacts, significance can be defined with reference to the baseline and quantitative indicators. Other qualitative assessments are based on professional judgement. They seek, so far as possible, to identify quantitative criteria as to the level of change in relation to the current capacity of the area (for example for schools and accommodation) or in the context of current annual rates of turnover and change in population as defined in **Table 1.2**. This recognises the dynamic nature of the environment with which the Sizewell C Project would interact.

1.3.58 The assessment has considered the following potential effects:

Economic Effects

1.3.59 The economic effects of the Sizewell C Project are primarily driven by the demand for goods from the supply chain, and services in terms of contracts and labour recruitment to deliver the project. These are informed by:

- the overall value of the Sizewell C Project; and
- the mix of contract packages required over the construction phase in terms of supply chain and employment.

1.3.60 Labour market effects are considered in terms of the demand for local employment and the benefits that brings to existing labour markets; and the amount of non-home-based labour brought into the region for the Sizewell

C Project. These influence the economy in terms of skills demands, productivity, effects on unemployment and economic inactivity, expenditure and additionality effects¹.

- 1.3.61 Direct site employment levels would result in changes to employment levels in the local employment structure. These would depend on both project characteristics, and associated policies, but there is likely to be a major increase in local employment/opportunities. There would also be a multiplier effect with indirect (e.g. local supplier firms) and induced (e.g. local service jobs) effects from the Sizewell C Project. There may also be some labour market churn as some employees move into roles on or associated with the Sizewell C Project from other local employers.
- 1.3.62 Primarily, employment effects are considered in terms of their value relative to the existing construction economy and labour market, levels of unemployment and economic inactivity and labour market churn, and output/productivity.
- 1.3.63 The socio-economic assessment also considers the wider economic effects of the Sizewell C Project including the proportion and estimated value of local supply chain benefits, and secondary benefits from employee spending.
- 1.3.64 In addition, the chapter looks at effects on other sectors – primarily:
- Tourism: considering potential sensitivities that may affect peoples' perceptions of the area, which may have the potential to translate into changes to visitor numbers, duration, frequency or type which may have economic consequences; and
 - Agriculture: in terms of loss of land and therefore agricultural activity supporting jobs. Effects on severance or changes to landholdings affecting businesses (accounting for any proposed mitigation that SZC Co. would undertake) is assessed in **Volume 2, Chapter 17** and **Chapter 10** of **Volumes 3-9** of the **ES** (Doc Ref. 6.4-6.10), **Soils and Agriculture**.

Accommodation Effects

- 1.3.65 The effects of the Sizewell C Project on accommodation and housing markets are driven by the number and location of non-home-based workers

¹ Net positive difference that results from economic development intervention. The extent to which an activity (and associated outputs, outcomes and impacts) is larger in scale, at a higher quality, takes place more quickly, takes place at a different location, or takes place at all as a result of intervention. Additionality measures the net result, taking account of deadweight, leakage, displacement, substitution and economic multipliers

associated with the Sizewell C Project, and the types of accommodation they are likely to stay in. The assessment considers the effects on:

- owner-occupied accommodation: potential for increased demand for family-type owner-occupied homes in the local area from long-term construction workforce and operational workers;
- effects on private rented accommodation: potential for increased demand for private rented accommodation from the non-home-based workforce, and particularly where there may be effects related to the lower 30th percentile of the sector where tenants may be in housing need or in receipt of housing benefits, or otherwise vulnerable to ending of tenancy; and
- effects on tourist accommodation: potential for increased demand for tourist accommodation from non-home-based workforce.

Public Services, Community and Demographics

1.3.66 The effects of the Sizewell C Project on the population, community facilities and public services they use are driven by the number and location of non-home-based workers throughout the workforce profile, and their demographic and characteristics. This influences how they may be anticipated to create additional demand for services/facilities. The assessment considers:

- Population/demographic change: changes in the local population level and structure. For example, there is likely to be a large non-home-based and male population during the construction phase, a proportion of whom could be accompanied by families; there would be smaller numbers with a longer term presence during the operational phase.
- Impact on local social conditions and associated services: project-related demographic changes have the potential to adversely impact on local social conditions and associated services. For example, during construction there could be a change in demand for local facilities, school and policing services which could create possible issues for the local population (e.g. impact on school places, crime in the community; traffic flows/noise).
- Other less tangible socio-cultural change: changes in the level and structure of employment and demographic changes could have the potential to affect quality of life, community character/cohesion and integration. Parts of the local community may be differently affected

by the Sizewell C Project, or there could be a shift in the character of some communities (especially those close to the main development site or on key transport routes to the project).

iii. Operation

1.3.67 Operational effects accord with many of the same principles listed above for construction phase effects in terms of the approach to a dynamic baseline. The effects are assessed from the completion of the construction phase, although it is recognised that the operational workforce starts to build up in advance of this.

1.3.68 The assessment draws on existing information from operations at Sizewell B, survey information for existing outages, experience from Hinkley Point C and published socio-economic datasets that set out economic values and demographic trends.

1.3.69 The assessment considers the following effects:

- Economic effects:
 - local recruitment and labour market effects;
 - generation of higher value-added jobs;
 - the effect of outages;
 - local indirect employment; and
 - business and supply chain.
- Accommodation effects and demand for accommodation in different sectors.

iv. Inter-relationships

1.3.70 Where relevant, the socio-economic assessment inherently includes inter-relationship effects on receptors related to other environmental aspects – for example, effects on emergency service provision refers to the socio-economic effects of the workforce, along with changes to response times reported in the **Transport Assessment** (Doc Ref. 8.5). As such, where relevant, mitigation strategies developed through the socio-economic assessment include measures that cross-cut environmental aspects for example the Community Fund and the **Community Safety Management Plan** (Doc Ref 8.16) and the Tourism Fund provided in **Volume 2, Chapter 9** of the **ES**.

- 1.3.71 The **Community Impact Report** (Doc Ref 5.13) sets out where receptors will experience one or more significant effects across different environmental topics on a local community basis, and signposts to the full assessment (and subsequent development of mitigation).

g) **Assumptions and limitations**

- 1.3.72 Sizewell C Project assumptions for the socio-economic assessment are set out in the Technical Notes appended to **Volume 2, Appendix 9A to 9E** of the **ES**. In summary, these assumptions and limitations include:
- assumptions about the duration and phasing of the Sizewell C Project and its associated development;
 - the size, profile and characteristics of the construction and operational workforce;
 - the recruitment of the workforce and the extent to which it would be HB and NHB;
 - the accommodation likely to be used by the NHB workforce;
 - limitations related to datasets (representing a ‘snapshot’ in time) and the approach to dynamism of the baseline; and
 - acknowledgement of internal and external uncertainties such as the political and economic climate.

Other Assumptions

- 1.3.73 The assessment of effects expected to arise from the Sizewell C Project is carried out against socio-economic baseline conditions as defined by the data sources referenced above. As with any dataset they represent a set point in time and can change due to wider changes in economic conditions or demographic trends. As far as possible the assessment has aimed to reflect the dynamic nature of this environment by using future projections and identifying sensitivities to change.
- 1.3.74 Given the long timescale involved, with construction expected to last 9-12 years and an operational life of 60 years, there is the potential for variation. The Sizewell C Project should be the subject of regular monitoring and revisions may be required as new information becomes available. An adaptive assessment process is required, using a ‘plan-monitor-management’ approach.

- 1.3.75 The predictions of effects are primarily for peak construction and full operation. The latter should be relevant for much of the operational life of the Sizewell C power station. For the former, the shoulders and peak construction may apply to only about three years of the programme. However, predictions for peak construction provide an important indicator of the maximum effects, and a justifiable precautionary approach.

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VOLUME 1, CHAPTER 6, APPENDIX 6F: TRANSPORT LEGISLATION
AND METHODOLOGY

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None provided.

1. Transport Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant transport effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites, unless otherwise indicated.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant transport effects of the Sizewell C Project as described in **Volume 2, Chapter 10 of the Environmental Statement (ES)** (Doc Ref. 6.2).

1.1.3 This appendix is intended to be read as part of the wider **Environmental Statement (ES)**, with particular reference to the **Transport Assessment (TA)** (Doc Ref. 8.5), the draft **Construction Traffic Management Plan (CTMP)** (Doc Ref. 8.7), draft **Construction Worker Travel Plan (CWTP)** (Doc Ref. 8.8) and the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11).

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant transport effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the transport environmental assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 There is no international legislation or policy deemed relevant to the environmental assessment of transport effects.

b) National

1.2.4 There is no national legislation deemed relevant to the environmental assessment of transport effects. A summary of the relevant national policy and guidance is provided below.

i. Policy

National Policy Statements

- 1.2.5 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.1) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.2). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C Development Consent Order (DCO) application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.6 A summary of the relevant NPS EN-1 and EN-6 requirements for the assessment of transport effects, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement.	How the Requirement has been Addressed.
NPS EN-1 Part 5.13.		
5.13.3	If a project is likely to have significant transport implications, then the ES should include a Transport Assessment using NATA/WebTAG methodology stipulated in the Department for Transport (DfT) Guidance.	The Transport Assessment (Doc 8.5) has been prepared in accordance with Planning Practice Guidance on CWTPs, Transport Assessments and Statements and will be provided separately from the ES (Doc. Ref Book 6).
5.13.3	Applicants should consult Highways England and local highway authorities as appropriate on the assessment and mitigation.	The local highway authority and Highways England have been consulted on the transport elements of the Sizewell C Project and a summary of stakeholder consultation is provided in section 1.3 of this appendix. Highways England have also been consulted with regards to the effects on the Strategic Road Network. The focus of consultation has been with Suffolk County Council (SCC) as they manage the local highway network that will be most impacted.
5.13.4	Where appropriate, the applicant should prepare a Travel Plan.	A draft CWTP (Doc Ref 8.8) will support the application.
5.13.5	If additional transport infrastructure is proposed, the applicant should discuss the possibility of co-funding by Government for any third-party benefits.	The proposed package of transport mitigation works are to be funded by SZC Co.
5.13.6	Requirement to provide mitigation measures for any transport impacts associated with the project, including during the construction phase.	Volume 2, Chapter 10 of the ES presents an assessment of transport effects associated with the Sizewell C Project and summarises the proposed mitigation, where it is necessary.
5.13.8	Where mitigation is needed, possible demand management measures must be considered and if feasible and operationally reasonable, required, before considering requirements for the provision of new inland transport infrastructure to deal with remaining transport impacts.	Management procedures and mitigation will be contained within the draft CTMP (Doc Ref. 8.7), draft CWTP and the draft Traffic Incident Management Plan (TIMP) (Doc Ref. 8.6) to support the application.
5.13.10	Water-borne or rail transport is preferred over road transport at all stages of the project, where cost-effective.	Volume 1, Chapter 4 of the ES summarises the strategic alternatives considered for freight management.
5.13.11	A requirement may be attached to a consent where there is substantial Heavy Goods Vehicle (HGV) traffic. These may relate to control of HGV movements and routing, provision for HGV parking or to make provision for abnormal disruption.	Construction traffic would be controlled through the draft CTMP .

National Planning Policy Framework 2019

1.2.7 The revised National Planning Policy Framework (NPPF) (Ref. 1.3) was updated in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied. The revised Framework replaces the previous NPPF which was published in March 2012, and revised in July 2018.

1.2.8 Within the Promoting Sustainable Transport chapter of the 2019 NPPF, paragraph 102 states that:

“Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

- *the potential impacts of the development on transport networks can be addressed;*
- *opportunities from existing or proposed transport infrastructure, and changing transport technology usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;*
- *opportunities to promote walking, cycling and public transport use are identified and pursued;*
- *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and*
- *patters of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.”*

1.2.9 Paragraph 111 further advises that:

“All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed.”

1.2.10 When referring to sites that may be allocated for development in plans, or specific applications for development, paragraph 108 of the NPPF states that planning policies and decisions should consider whether:

- *“appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and location;*
- *safe and suitable access to the site can be achieved for all users; and*
- *any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.”*

1.2.11 Within this context, paragraph 109 therefore states that:

“Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.”

Government's 25 Year Environment Plan

1.2.12 The Government's 25 Year Environment Plan (**Error! Reference source not found.**) states that through the 'Future of Mobility' Grand Challenge, becoming a world leader in shaping the future of mobility, including the low carbon transport of the future is a priority. As such developments should take into account the four early priorities including:

- establishing a flexible regulatory framework to encourage new modes of transport and new business models;
- seeking opportunities and addressing the challenges of moving from hydrocarbon to zero emission vehicles;
- preparing for a future of new mobility services, increased autonomy, journey-sharing and a blurring of the distinctions between private and public transport; and
- exploring ways to use data to accelerate the development of new mobility services and enable the more effective operation of our transport system.

ii. National Guidance

Guidance on Transport evidence bases in plan making and decision taking

1.2.13 To supersede the withdrawn DfT's 'Guidance on Transport Assessment' (2007), The Ministry of Housing, Communities and Local Government published its 'Guidance on Transport evidence bases in plan making and decision taking' in March 2015 (Ref. 1.5). The guidance sets out the following principles which a transport evidence base should highlight:

- *“opportunities for encouraging a shift to more sustainable transport usage;*
- *infrastructure requirements for inclusion in infrastructure spending plans linked to the Community Infrastructure Levy, section 106 provisions and other funding sources; and*
- *possible transport mitigation measures.”*

c) Regional

1.2.14 There are no regional policies deemed relevant to the assessment of transport effects.

d) Local policy and other relevant documents

i. Policy

1.2.15 The relationship between national and local policy is apparent in the local statutory development plans for Suffolk Coastal District and Waveney District.

1.2.16 On 1st April 2019, a new district, East Suffolk Council (ESC) was established by parliamentary order, covering the former districts of Suffolk Coastal District Council (SCDC) and Waveney District Council (WDC). The Local Government (Boundary Changes) Regulations 2018 (part 7) state that any plans, schemes, statements or strategies prepared by the predecessor council should be treated as if it had been prepared and, if so required, published by the successor council (Ref. 1.6). Therefore, in the context of this report, the adopted SCDC and WDC Local Plans apply until such time that they are replaced, however cognisance has been made of the East Suffolk Final Draft Local Plan (January 2019).

Suffolk Coastal Local Plan (2013)

- 1.2.17 The adopted Suffolk Coastal Local Plan (Ref. 1.7) covers the former SCDC area and was formally adopted in July 2013. The plan sets out how the area should be developed, and is the starting point when making decisions on planning applications. Although work is currently being undertaken to prepare a new Local Plan for the ESC to cover the period 2018–2036, existing policies within the currently adopted Suffolk Coastal Local Plan remain applicable until 2027.
- 1.2.18 The currently adopted Local Plan recognises that National Policy has identified Sizewell as a potentially suitable site for the development of an additional nuclear power station. However, the adopted Suffolk Coastal Local Plan is clear that any decision on such an application will be taken ‘at a national level’ and that the role of the local planning authority is simply as a statutory consultee.
- 1.2.19 The key transport objectives of the adopted Suffolk Coastal Local Plan focus upon enhancing the transport network across the district. Objective 8 of the adopted Suffolk Coastal Local Plan details the following transport outcomes:
- *“To work with partners and developers to provide an integrated and well managed transport system that meets the needs of residents and businesses. It should minimise the need for people to travel by private car, make the most of opportunities for freight to be moved by means other than road, and ensure that improvements are made to public transport and to the local foot and cycle networks, particularly when they provide access to local facilities.*
 - *To secure (at an appropriate time) any identified necessary improvements to the transport network where it is required to support the scale and distribution of new housing and employment development as set out in the Settlement Hierarchy.*
 - *To continue to recognise that the nature of the district is such that the use of private motor vehicles will remain important, particularly within the rural areas. This should be reflected in standards of provision for off-road parking. At the same time, to support innovative approaches to the provision of public transport across these more rural areas to help address problems of rural isolation.*
 - *To work with others, particularly the highways agencies and neighbouring local authorities, to identify longer term solutions which may be necessary to help ensure that both the A14 and A12 are able to continue to operate as strategic routes.”*

1.2.20 Strategic Policy SP10 (A14 & A12) states that:

- *“the A14 is an important route on the European map providing a link from the Port of Felixstowe to the remainder of the UK and its markets. Ensuring that it continues to function as a strategic route is of national and international significance. Off-site Port related activities should be located on or well related to this transport corridor;*
- *improvements to the A12 south from its junction with the A1214 at Martlesham to the Seven Hills interchange will be required in conjunction with strategic employment and housing development proposed east of the A12 with funding provided by means of developer contributions.”*

1.2.21 Strategic Policy SP11 (Accessibility) states that:

- *“In order to make the best use of capacity within the local and strategic road and rail networks serving the district, to support the District’s strategic economic role both within the subregion and nationally, to maintain quality of life and to contribute to reducing the impact of CO₂ on climate change, the District Council will work with neighbouring authorities, the highway authority, public transport providers, developers and others to maximise opportunities for local journeys to be made by means other than the private motor car.*
- *In relation to public transport this will include improving both the quantity and quality of the service on offer. In relation to foot and cycle provision this will mean securing safe and easy access to local facilities where walking or cycling offers a realistic alternative for most people.*
- *Where new services and facilities are to be provided by means of developer contributions in association with new developments, their timely provision will be secured by means of conditions, legal agreements and/or through the Community Infrastructure Levy (CIL) (once a charging schedule has been adopted). The transfer of freight from road to rail will also be encouraged.”*

1.2.22 Development Management Policy DM19 (Parking Standards) states that:

- *“Proposals for all types of new development will be required to conform to the District Council’s adopted parking standards as set out in a Supplementary Planning Document.*
- *However, in town centres and other locations with good access to public transport, the District Council may make exceptions as a transport management tool or where it is impracticable to make parking provision on-site.*
- *In such cases the Council may also, in order to allow the development to proceed, invite applicants to contribute to the provision of cycling provision, walking measures, public transport, or additional public car parking spaces in lieu of any shortfall in on-site car parking provision.”*

1.2.23 Development Management Policy DM20 (Travel Plans) states that:

“Proposals for new development that would have significant transport implications should be accompanied by a ‘green travel plan’. It is not necessarily the size of the development that would trigger the need for such a plan but more the nature of the use and would include:

- *new employment sites employing over 10 people;*
- *a use which is aimed at the public (e.g. retail, leisure activities); or*
- *major residential development.*

The travel plans should seek to reduce the use of private cars by:

- *Encouraging car sharing.*
- *Provide links to enable the use of public transport.*
- *Improve road safety for pedestrians and cyclists.*
- *Identify any mitigation works to be funded by the developer in conjunction with the proposal, such as improvements of facilities at the nearest transport interchanges. A condition or a legal agreement will be imposed to ensure implementation of the travel plan.”*

Waveney Local Plan (2019)

- 1.2.24 The Waveney Local Plan (Ref. 1.8) was adopted by WDC in March 2019 and covers the former Waveney Local Planning Authority area for the period 2014–2036. The Waveney Local Plan sets out the level of growth which needs to be planned in the area and identifies where growth should be located and how it should be delivered. The Waveney Local Plan details the planning policies which the council will use to determine planning applications in the Waveney area.
- 1.2.25 The Sustainable Transport chapter of the Waveney Local Plan sets out a priority to help improve the use of sustainable transport options and reduce the risk of congestion.
- 1.2.26 Policy Waveney Local Plan 8.21 (Sustainable Transport) describes the basic principles for encouraging sustainable modes of transport. It comments that development proposals should be designed from the outset to incorporate measures that encourage people to travel using non-car modes to access home, school, employment, services and facilities. It also requires developers to have regard to the Waveney Cycle Strategy and subsequent updates. The policy states that development will be supported where:
- *“it is proportionate in scale to the existing transport network;*
 - *it is located close to, and provides safe pedestrian and cycle access to services, facilities and public transport;*
 - *it is well integrated into and enhances the existing cycle network including the safe design and layout of new routes and provision of covered, secure cycle parking;*
 - *it is well integrated into, protects and enhances the existing pedestrian routes and the public rights of way network;*
 - *it reduces conflict between users of the transport network including pedestrians, cyclists, users of mobility vehicles and drivers and does not reduce road safety;*
 - *it will improve public transport in rural areas of the District;*
 - *it includes facilities for charging plug-in and other ultra-low emission vehicles; and*
 - *the cumulative impact of new development will not create severe impacts on the transport network.”*

Suffolk Coastal Final Draft Local Plan (2019)

- 1.2.27 The yet to be adopted Suffolk Coastal Final Draft Local Plan (Ref. 1.9) for the new East Suffolk Council, covering the period to 2036, contains planning policies and site allocations which will be used to determine planning applications within the new council area. It sets out the level of growth which needs to be planned for and identifies where this should be located.
- 1.2.28 The Suffolk Coastal Final Draft Local Plan identifies that the A12 through Saxmundham provides important connections to the numerous communities within the area and directs development towards it. It is considered that developments situated in the key transport corridor will enable opportunities to make more use of both road and rail connections, particularly those between Ipswich and Lowestoft. The Suffolk Coastal Final Draft Local Plan considers that by increasing the level of development in these locations will help to sustain the existing communities and enhance the level of services and facilities found in this part of the district. The Suffolk Coastal Final Draft Local Plan also identifies that:
- “The emergence of Sizewell C Nuclear Power Station will also further support the strategic growth of Saxmundham as a Market Town with a variety of services and facilities.”*
- 1.2.29 Policy Suffolk Coastal Local Plan 7.1 of the Suffolk Coastal Final Draft Local Plan – Sustainable Transport:
- “encourages and facilitates the use of sustainable transport options where possible, and supports the efficient use of existing transport networks.”*
- 1.2.30 The policy recognises and promotes the use of CWTPs, as per the NPPF, to maximise this use of sustainable options and the efficient use of existing transport networks for substantial development sites.
- 1.2.31 Under the policy a development will be supported where:
- *“it is proportionate in scale to the existing transport network;*
 - *it is located close to, and provides safe pedestrian and cycle access to services and facilities;*
 - *it is well integrated into and enhances the existing cycle network including the safe design and layout of new cycle routes and provision of covered, secure cycle parking;*

- *it is well integrated into, protects and enhances the existing pedestrian routes and the public rights of way network;*
- *it reduces conflict between users of the transport network including pedestrians, cyclists, users of mobility vehicles and drivers and does not reduce road safety;*
- *it will improve public transport in the rural areas of the District; and*
- *the cumulative impact of new development will not create severe impacts on the existing transport network.”*

1.2.32 The Suffolk Coastal Final Draft Local Plan promotes the use of electric vehicle charging points within developments and parking provision in general is covered under policy Suffolk Coastal Local Plan 7.2 – Parking Proposals and Standards. The Suffolk Coastal Final Draft Local Plan policy primarily directs the reader to SCC document ‘Suffolk Guidance for Parking’ (published 2015) for guidance and generally supports development involving parking where they make efficient use of land and include:

- *“the provision of safe, secure, and convenient off-street parking of an appropriate size and quantity including addressing the need for parking or secure storage for cars, cycles and motorcycles, and where relevant, coaches and lorries;*
- *opportunities to reduce the recognised problem of anti-social parking or potential problems that may arise which impacts the quality of life or vitality of an area for residents and visitors;*
- *appropriate provision for vehicle charging points and ancillary infrastructure associated with the increased use of low emission vehicles; and*
- *the incorporation of sustainable drainage systems (SuDS), permeable surfacing materials and means of protecting water quality in drainage schemes should be ensured.”*

1.2.33 Where proposals involve public transport improvements or re-developments, ESC will encourage the provision of park and ride facilities, if appropriate. The Suffolk Coastal District Local Plan indicates that land to the north of the Darsham railway station between the A12 and the railway line is being promoted by SZC Co. in line with the Sizewell C Project development for a park and ride site. This is designated as the northern park and ride site at Darsham and is approximately an 18–20-minute bus journey from the Sizewell C Project site. A southern park and ride site is also proposed to the north of Wickham Market, a 26–30-minute bus journey from the site.

ii. Other relevant documents

Suffolk Guidance for Parking (2015)

- 1.2.34 Whilst not definitive, the guidance document ‘Suffolk Guidance for Parking’ (Ref. 1.10) provides guidance on the number and type of electric vehicle, bicycle, motorcycle disabled and general car parking at new developments within the SCC area. The guidance was adopted in November 2014 and updated in line with the NPPF in November 2015. Over and above this however, the appropriateness parking provision for individual applications will be considered.

Suffolk Local Transport Plan (2011)

- 1.2.35 The Suffolk Local Transport Plan (LTP) 2011–2031 (Ref. 1.11) is a 20-year strategy that highlights Suffolk’s long-term ambitions for the transport network. It sets out a priority to support the growth of businesses, reducing the demand for car travel, making efficient use of transport networks and improving infrastructure.
- 1.2.36 The LTP describes how transport will play a key role in supporting and facilitating future sustainable economic growth. Within the urban areas, there are three strands to Suffolk’s transport strategy approach:
- *“Reducing the demand for car travel.*
 - *More efficient use and better management of the transport network.*
 - *Where affordable – infrastructure improvements, particularly for sustainable transport.”*
- 1.2.37 In comparison, within rural areas the transport strategy is based around five themes which focus on the need to strengthen communities so that they are better placed to address local problems themselves:
- *“Better accessibility to employment, education and services.*
 - *Encouraging planning policies to reduce the need to travel.*
 - *Maintaining the transport network and improving its connectivity, resilience and reliability.*
 - *Reducing the impact of transport on communities.*
 - *Support the county council’s ambition of improving broadband access throughout Suffolk.”*

- 1.2.38 This demonstrates that local transport policy supports the provision of sustainable travel measures above new road building and capacity improvements. However, the LTP also highlights that an underpinning priority is to maintain the current highway network in a satisfactory condition and to prevent it from deteriorating and adversely affecting local transport, the economy and road safety.
- 1.2.39 Both approaches aim to support the priorities of ‘Suffolk’s Sustainable Community Strategy’ (2008–2028) (Ref. 1.12) in helping residents achieve a high quality of life, create stronger and more self-reliant communities, and capitalise on future opportunities for sustainable economic development.
- 1.2.40 The below **Table 1.2** highlights the connection between headline themes of the community strategy and transport aims within Suffolk:

Table 1.2: The relationship between Suffolk’s priorities and the Suffolk Local Transport Plan transport aims.

Suffolk’s Priorities	Transport Aims
A prosperous and vibrant economy.	<p>Improve connectivity and accessibility.</p> <p>Maintain core transport networks. Balance capacity and demand for travel, through increasing the use of sustainable transport and reducing the need for travel.</p> <p>Improve access to jobs and commercial markets for residents and businesses based in the county.</p>
Creating the greenest county.	<p>Reduced emissions from transport, including road maintenance.</p> <p>Maintaining resilience of transport networks (e.g. coping with flooding, pot holes, winter damage).</p> <p>Reduced air pollutant emissions.</p>
Safe, healthy and inclusive communities.	<p>Facilitating an increase in walking and cycling.</p> <p>Improving the physical accessibility of the transport system, improving information about travel options, improving access to services for those without access to cars.</p> <p>Supporting wider regeneration.</p> <p>Reducing the number of casualties on the transport network.</p> <p>Reducing the impact of poor air quality on local communities.</p>
Learning and skills for the future.	<p>Improving accessibility to schools, colleges, universities and other places of learning.</p>

- 1.2.41 Furthermore, the Suffolk Local Transport Plan clarifies the need to work with developers to produce travel plans that minimise car use and encourage alternative forms of transport. Taking a holistic approach to enhancing the transport network through the creation of pedestrian and cycle-friendly environments will support movement within and around Suffolk.

New Anglia Strategic Economic Plan (2014)

- 1.2.42 In March 2014, the New Anglia Local Enterprise Partnership (NALEP) submitted its Strategic Economic Plan (SEP) (Ref. 1.13) to the government. The document makes the case for investment in a large number of transport, infrastructure, skills and housing projects which the NALEP believes are required to help the East Anglian economy provide 95,000 new jobs, 117,000 new homes and 10,000 new businesses by 2026.
- 1.2.43 Within chapter 6 (Growth Locations) of the SEP, the ‘A12 and Sizewell’ are identified as areas that host a high impact sector activity which require investment in order to unlock employment potential.
- 1.2.44 Paragraph 6.72 details NALEP’s key transport priority with regards to the Sizewell C development:

“A bypass of Stratford St. Andrew, Farnham, Little Glemham and Marlesford is needed to keep HGV traffic off of the A12 through these villages.”

- 1.2.45 Furthermore, the SEP also highlights that the A12 is an important route serving the growing and expanding low carbon energy corridor between Sizewell and Lowestoft. On this basis, the document recognises that the Sizewell C Project will aid in establishing East Suffolk as the centre for the UK’s clean energy sector, adding to a number of notable projects currently in operation along ‘Suffolk’s Energy Coast’. One such project is the ‘A12 Suffolk Energy Gateway Scheme (SEGway)’ which comprises an improvement to the 4.5-mile (7km) section between the B1078 at Wickham Market and the A1094 at Saxmundham in East Suffolk (Ref. 1.14).

Integrated Transport Strategy for Norfolk and Suffolk (2018)

- 1.2.46 The Integrated Transport Strategy for Norfolk and Suffolk (Ref. 1.15) was adopted by the NALEP in May 2018 and sets out their ambition and collective goals for the delivery of transport infrastructure improvements up to 2040.
- 1.2.47 The Transport Strategy highlights priority locations where significant opportunities and commitment to growth have been identified. One such location identified includes:

“The Norfolk and Suffolk Energy Coast, including Bacton, Great Yarmouth, Lowestoft and Sizewell, with assets on and offshore.”

1.2.48 The document further highlights that the Norfolk and Suffolk Energy Coast is a substantial contributor to the economy of the East of England, and serves Sizewell nuclear power station, Bacton Gas Terminal, and the large offshore energy sector as part of the wider East of England Energy Zone.

1.2.49 Sustainable transport and multi modal partnerships are emphasised by the NALEP in order to achieve their transport goals across the region.

Suffolk Roadsafe Strategy

1.2.50 The Suffolk Roadsafe Strategy 2012 to 2022 (Ref. 1.16) sets out how the Suffolk Roadsafe Partnership will continue to work to reduce the number of deaths and serious injuries occurring on Suffolk's road network. It is intended that the strategy should complement the aim of Suffolk's Local Transport Plan (LTP) 2011-2031 in supporting Suffolk's economy and future sustainable growth by making travel safer and healthier.

1.2.51 A key focus of the strategy is to:

“reduce the dominance of motorised vehicles and improve conditions for cycling and walking.”

1.2.52 As a result, the strategy aims to ensure that road safety activities inevitably make travel safer whilst at the same time encourage the use of sustainable transport.

The Suffolk Walking Strategy (2015)

1.2.53 The Suffolk Walking Strategy 2015–2020 (Ref. 1.17) aims to make walking the default choice for journeys of 20 minutes or less in order to improve community health, happiness and the local environment.

1.2.54 The strategy highlights the benefits walking can bring to society from a transport and infrastructure perspective. These include:

- *“reduced road traffic casualties, currently costing £3.4 billion per year (2011);*
- *increased use of public transport as an element of active travel;*
- *reduced traffic congestion;*
- *reduced carbon emissions and air pollution, currently responsible for 100,000 deaths per year within the EU (2011);*
- *reduced transport costs to Suffolk County Council for travel to educational and medical locations; and*

- *increased use of rural public rights of way and natural green spaces or parks.”*

Suffolk Cycling Strategy (2014)

1.2.55 The Suffolk Cycling Strategy (Ref. 1.18) was adopted by Suffolk County Council in 2014 with a vision to increase the number of people cycling in Suffolk, subsequently establishing it as a normal form of transport for everyone. The strategy aims to:

- *“encourage cycling across all sectors of the community, supporting Suffolk’s ‘Most Active County’ ambitions;*
- *promote a transfer to cycling (and walking) for short private car trips, supporting Suffolk’s ‘Creating the Greenest County’ ambitions;*
- *promote the benefits of cycling for public health and long-term savings in the health budget;*
- *foster enthusiasm for cycling in young people;*
- *plan and design for the future with cycling in mind; and*
- *create a safe and cycle friendly environment.”*

1.2.56 The strategy further highlights the benefits cycling can bring to Suffolk in terms of transport and infrastructure. These include:

- *“Alleviate the cost and impact of traffic congestion to local business and public health.*
- *Reduce traffic levels by the use of cycling, leading to improved journey time reliability, encouraging the use of public transport.*
- *Reduce greenhouse gas emissions from transport, helping to deal with climate change.*
- *Improved travel choices for all, encouraging a modal switch to cycling as a sustainable option.”*

Waveney Cycle Strategy (2016)

1.2.57 The Waveney Cycle Strategy (Ref. 1.19) sets out the Council’s vision for cycling in Waveney. It identifies existing issues and suggests potential improvements to the cycle network with the aim of encouraging more people to cycle for commuting and recreation. The strategy also provides supporting information regarding issues such as design that should be taken into account when planning proposals are being prepared and determined.

1.2.58 Waveney Cycle Strategy highlights parallel transport and infrastructure benefits to those highlighted by the Suffolk Cycling Strategy, yet expands upon previous guidance to discuss how potential improvements could encourage more people to consider cycling as both a utility and recreational form of transport and exercise. Such improvements could include the provision of:

- clear layouts and configuration of cycling infrastructure;
- distinct way-finding measures and consistent types of cycle lanes to follow along routes;
- sufficiently maintained cycle paths, routes and way-finding measures;
- on-road cycle lanes that are wide enough to foster a sense of safety;
- cycle lane surfaces in a suitable condition, providing a comfortable riding experience; and
- convenient and well-located cycle parking and storage.

e) Guidance

1.2.59 The assessment of transport effects presented in **Chapter 10 of Volume 2** of the **ES** has been undertaken in accordance with the following guidance documents:

- The Guidelines for the Environmental Assessment of Road Traffic published by the Institute of Environmental Assessment in 1993 (now Institute of Environmental Management and Assessment (IEMA)).
- Volume 11 of the Design Manual for Road and Bridges (DfT 2008) – Environmental Assessment.

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The overarching Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES** (Doc Ref. 6.2).
- 1.3.2 This section outlines the transport methodology applied to the assessment of the Sizewell C Project and a summary of the general approach to provide appropriate context for the assessment that follows. The scope of assessment considers the impacts of the early years of construction, peak construction, and operational phases of the Sizewell C Project.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA scoping opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5 This appendix focuses on the potential transport impacts of:
- severance;
 - pedestrian delay;
 - pedestrian amenity;
 - fear and intimidation;
 - driver delay;
 - accidents and safety; and
 - hazardous loads.
- 1.3.6 Assessment of hazardous loads associated with the transport of radioactive materials is presented in **Volume 2, Chapter 25** Radiological Effects (Doc Ref. 6.3).
- 1.3.7 In summary, the underlying objectives of the assessment of transport effects are to:

- identify the potential transport impacts of the Sizewell C Project, taking into account the characteristics of the Sizewell C Project and the sensitivities of the local environment;
- identify and describe measures which would be taken to mitigate any identified adverse effects; and
- predict and evaluate the extent and significance of residual effects taking into account all mitigation proposed.

b) Study area

- 1.3.8 The study area for the assessment has been defined based on the area where there is likely to be a transport impact resulting from the construction and operation of the Sizewell C Project and additional developments. This includes routes along which HGVs and construction worker cars will travel during the works programme.
- 1.3.9 The study area covers parts of the east of Norfolk extending to Lowestoft in the north, Ipswich to the south and the A140 to the west. The geographic extent of the traffic model has been agreed with SCC.
- 1.3.10 The study area comprises:
- the main development site (a description of this study area is provided in **Volume 2, Chapter 2** of the **ES** (Doc Ref. 6.3));
 - northern park and ride at Darsham (a description of this study area is provided in **Volume 3, Chapter 1** of the **ES** (Doc Ref. 6.4));
 - southern park and ride at Wickham Market (a description of this study area is provided in **Volume 4, Chapter 1** of the **ES** (Doc Ref. 6.5));
 - two village bypass (a description of this study area is provided in **Volume 5, Chapter 1** of the **ES** (Doc Ref. 6.6));
 - Sizewell link road (a description of this study area is provided in **Volume 6, Chapter 1** of the **ES** (Doc Ref. 6.7));
 - Yoxford roundabout and other highways improvements (a description of this study area is provided in **Volume 7, Chapter 1** of the **ES** (Doc Ref. 6.8)); and
 - freight management facility (a description of this study area is provided in **Volume 8, Chapter 1** of the **ES** (Doc Ref. 6.9)).

- 1.3.11 Rail is not included in the study area because a highway assignment model has been used and this is only designed to assess impacts of highway traffic on the road network.
- 1.3.12 The highway network to be used by the construction traffic includes a number of A and B classified roads.
- 1.3.13 In order to clearly display the links assessed and sensitive receptors within the vicinity of the links, the study area has been sub-divided into four sub-areas of the highway network:
- Sub-area A – north.
 - Sub-area B – south.
 - Sub-area C – east.
 - Sub-area D – west.
- 1.3.14 The extent of each of these sub-areas is shown on **Figure 10.1** in **Volume 2** of the **ES**.
- c) **Screening process**
- 1.3.15 Within the IEMA guidance (Ref. 1.20), two broad rules are suggested that can be used as a screening process to define the scale and extent of the assessment:
- Rule 1: include highway links where traffic flows would increase by more than 30% (or the number of HGVs would increase by more than 30%).
 - Rule 2: include any other specifically sensitive areas (where sensitivity is defined as high) where traffic flows have increased by 10% or more.
- 1.3.16 Determination for the sensitivity of areas is defined within **Volume 2**, **Appendix 10B** of the **ES**.
- 1.3.17 The IEMA guidance is based on knowledge and experience of the environmental effects of traffic. The threshold of 30% has been set based on experience that imperceptible changes in the environmental effects of traffic are generally experienced when there is less than a 30% increase in traffic. Additionally, projected changes in total traffic flow of less than 10% create no discernible environmental effect, hence the second threshold as set out in Rule 2.
- 1.3.18 In addition to these two rules, the assessment has considered an additional rule in the screening process ('Rule 3'):

- Rule 3: include highways links which Suffolk County Council (SCC) have determined to be of particular sensitivity.

d) Consultation

- 1.3.19 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process including with SCC and East Suffolk District Council (ESDC). Details on SZC Co.'s approach to the Stage 3 pre-application consultation for Transport are provided in the **Consultation Report** (Doc Ref. 5.1).

e) Assessment scenarios

i. Assessment years

- 1.3.20 **Volume 2, Chapter 10** of the **ES** assesses the transport effects associated with the following phases of the Sizewell C Project:

- Early years – the effect of additional traffic movements associated with the Sizewell C Project (workforce and HGV movements) on the highway network during the early years of construction of the main development site and the associated development sites.
- Peak construction – the effect of additional traffic movements associated with the Sizewell C Project (workforce and HGV movements) on the highway network during the peak period of construction of the main development site, once all associated development sites have been constructed and are operational.
- Operational – the effect of additional movements on the highway network associated with the operation of the main development site.

- 1.3.21 Removal and reinstatement – separate modelling for the removal and reinstatement phase has not been completed, however, the number of additional traffic movements associated with the removal and reinstatement of the associated development site is considered to be no greater than during the peak construction phase and therefore, a qualitative assessment is presented on this basis.

- 1.3.22 Furthermore, on some days during the peak construction year, the number of HGV deliveries would be higher than on a typical day, so two scenarios have been assessed for the peak construction phase, representing a 'typical day' and a 'busiest day' with the only difference being the number of Sizewell C HGVs.

- 1.3.23 During the operational phase, traffic generation would be lower than during construction, however the operational phase has been assessed to provide an assessment of the permanent effects of the Sizewell C Project and because traffic generation would occur at different times of the day and some associated developments would have been removed.
- 1.3.24 Cumulative traffic flows with other non-Sizewell C Project schemes have been assessed as part of the reference case for the assessment scenarios set out above, as this presents a worst-case scenario. Quantitative cumulative traffic flows include traffic associated with the Scottish Power Renewables East Anglia One North and East Anglia Two schemes and background growth associated with the future baseline, which is considered to account for the increase in traffic associated with all other cumulative schemes identified in **Volume 10** of the **ES**.
- 1.3.25 The construction of Scottish Power Renewables East Anglia One North and East Anglia Two schemes is assumed to be complete by the start of the operational stage of the main development site. As the Scottish Power Renewables East Anglia One North and East Anglia Two schemes are not considered to generate traffic during operation, no cumulative assessment has been undertaken with Scottish Power Renewables East Anglia One North and East Anglia Two during operation as provided in **Volume 10** of the **ES**.
- 1.3.26 The future baseline traffic conditions, which account for background growth (i.e. growth in traffic volumes expected to arise in future without the Sizewell C Project), are then compared with future Sizewell C Project traffic conditions to assess the impact of the Sizewell C Project on the highway transport networks.
- 1.3.27 All transport related mitigation measures are described in **Volume 2, Chapter 10** of the **ES**. An assessment of residual effects following the implementation of all mitigation measures is also presented.
- 1.3.28 The baseline year against which future baseline traffic conditions have been calculated is 2015. The future baseline traffic conditions are compared with future development traffic conditions to assess the impact of the Sizewell C Project on the transport networks. In summary the assessment scenarios set out in this chapter are:
- Early years – 2023, including:
 - 2023 reference case (i.e. the 2023 future year traffic flows without the Sizewell C Project traffic).
 - 2023 early years (with Sizewell C Project traffic).

- 2023 cumulative early years (with Scottish Power Renewables East Anglia One North and East Anglia Two and Sizewell C Project traffic).
- Peak construction – 2028, including:
 - 2028 reference case (i.e. the 2028 future year traffic flows without Sizewell C Project traffic).
 - 2028 peak construction typical day (with Sizewell C Project traffic).
 - 2028 peak construction busiest day (with Sizewell C Project traffic).
 - 2028 cumulative typical day (with Scottish Power Renewables East Anglia One North and East Anglia Two and Sizewell C Project traffic).
 - 2028 cumulative busiest day (with Scottish Power Renewables East Anglia One North and East Anglia Two and Sizewell C Project traffic).
- Operation – 2034, including:
 - 2034 reference case (i.e. the 2034 future year traffic flows without Sizewell C Project traffic).
 - 2034 operational (with Sizewell C Project traffic).

1.3.29 Removal and reinstatement phase of temporary associated development sites has been assessed qualitatively without a separate modelling scenario.

ii. Representative hour

1.3.30 A representative hour has been calculated to be considered within the assessments and present the hour of greatest change. To calculate the representative hour, the average traffic flows across all links in the network have been reviewed, for each reference case and with the Sizewell C Project, for each hour. The percentage change in each hour has then been calculated and the hour with the highest percentage change identified.

1.3.31 The representative hour assessment is presented alongside the overarching assessment and any additional effects have been identified and mitigated.

1.3.32 The representative hour for each phase of development is presented below:

- Early years: 7-8am.

- Peak construction (busiest day):
 - Across ‘daytime hours’ (7am-11pm): 10-11pm.
 - Between 7am-6pm: 7-8am.
- Operational: 4-5pm.

1.3.33 For peak construction the representative hour initially was identified as 10pm – 11pm when hours are ‘daytime hours’ of 7am – 11pm. Given the assessments are to assess impact on vulnerable road users it is important that the representative hour is a reflection of when vulnerable road users are likely to be on the network. As such, the representative hour for peak construction when the hours are restricted to 7am – 6pm is 7am – 8am.

f) Assessment criteria

1.3.34 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.35 A summary of the assessment criteria used in the transport environmental assessment presented in **Chapter 10** of **Volume 2** of the **ES** is presented in the following sub-sections.

i. Sensitivity

1.3.36 Receptors of potential effects associated with the Sizewell C Project can be people, wildlife or elements of the natural and built environment. In the context of this chapter, receptors are considered to be users of the local highway network to whom the transport effects of the Sizewell C Project from its construction and operation would be perceptible.

1.3.37 These include:

- non-motorised users using the local highway network (including pedestrians, cyclists and equestrians); and
- drivers / passengers of motorised vehicles using the local highway network.

1.3.38 All receptors will exhibit a greater or lesser degree of sensitivity to the changes brought about by the Sizewell C Project. The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. It is defined by the following factors:

- Adaptability.
- Tolerance.
- Recoverability.

1.3.39 The sensitivity of a road can be defined by the vulnerability of the user group who may use it as provided below in **Table 1.3**.

Table 1.3: Assessment of the value or sensitivity of receptors for transport.

Sensitivity	Description
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, urban/residential roads without footways that are used by pedestrians.
Medium	Receptors with medium sensitivity to traffic flow: doctors' surgeries, hospitals, shopping areas with roadside frontage, recreation facilities, cycle routes and roads used by pedestrians with narrow footways.
Low	Receptors with low sensitivity to traffic flow: places of worship, public open space, tourist attractions and roads with adequate footway provision.
Very low	Receptors with very low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

1.3.40 A desktop study was undertaken in conjunction with site visits, field surveys and consultee engagement to identify all sensitive receptors in the study area. All road links to be used by works traffic within the study area have been assessed and assigned sensitivity, as summarised in **Volume 2, Chapter 10** of the **ES**. In addition there are a number of links that SCC have classed as sensitive that do not necessarily follow the above table but have been included as sensitive receptors in **Volume 2, Chapter 10** of the **ES**.

ii. Magnitude of impact

1.3.41 The magnitude of an impact is typically defined by four factors:

- Extent (area over which an effect occurs).
- Duration (time over which the effect occurs).
- Frequency (how often the effect occurs).

- Severity (degree of change relative to existing environmental conditions).

1.3.42 The following paragraphs describe the relevant factors in predicting the magnitude of change for each of the impacts considered in **Volume 2, Chapter 10** of the **ES**.

Severance

1.3.43 Severance is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery. It describes a series of factors that separate people from places and other people. Such division may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself.

1.3.44 The measurement and prediction of severance is difficult, but relevant factors include road width, traffic flow, speed, the presence of crossing facilities and the number of movements across the affected route.

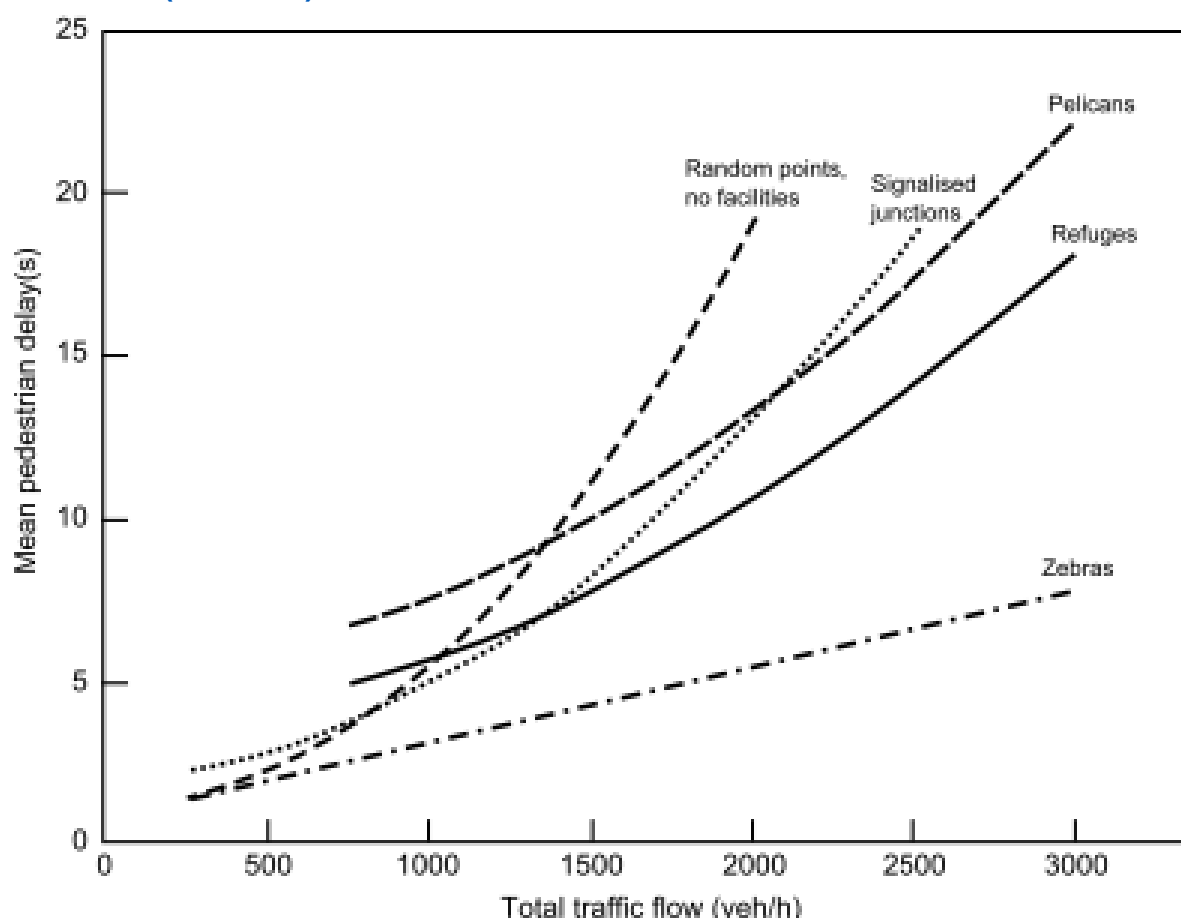
1.3.45 IEMA guidelines refer to the DfT's 'Manual of Environmental Appraisal' (Ref. 1.20), which suggests that changes in traffic flow of 30%, 60% and 90% would be likely to low, medium and high magnitude of impact on severance, respectively. It is advised that these broad indicators should be used with care and regard paid to specific local conditions.

Pedestrian delay

1.3.46 IEMA guidelines (Ref. 1.20) note that changes in the volume, composition and/ or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The guidelines do not set any thresholds, recommending instead that assessors use their judgement to determine the significance of the impact.

1.3.47 The IEMA guidelines refer to a report published by the Transport Research Laboratory (Ref. 1.21), as providing a useful approximation for determining pedestrian delay. The Transport Research Laboratory research concluded that mean pedestrian delay was found to be 8 seconds at flows of 1,000 vehicles per hour and below 20 seconds at 2,000 vehicles per hour for various types of crossing conditions. This research has been reproduced in the Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 (Ref. 1.22). **Figure 1** of Part 8 provides predictive mean pedestrian delay based on empirical data taking into account traffic flow and a range of parameters such as crossing width and vehicle speeds. This figure is shown in **Plate 1.1** below. The x axis is total traffic flow (veh/hr) and the y axis is mean pedestrian delay (seconds).

Plate 1.1: Mean pedestrian delays associated with different road crossing situations (Ref. 1.21).



1.3.48 A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold for assessment (equating to a mean 10 second delay for a link with no pedestrian facilities in the Transport Research Laboratory report). Below this flow pedestrian delay is unlikely to be a significant factor. This is deemed a robust starting point for narrowing down the modelled routes within the study area and ensuring the routes selected exceeded the suggested threshold of analysis in Design Manual for Roads and Bridges Volume 11. It should be noted that for controlled forms of pedestrian crossing, the pedestrian delays are less.

Pedestrian amenity

1.3.49 IEMA guidelines (Ref. 1.20) define pedestrian amenity as the relative pleasantness of a journey and can include fear and intimidation, if relevant. As with pedestrian delay, amenity is affected by traffic volumes and composition along with pavement width and pedestrian activity. The guidelines suggest thresholds of significance should be where the traffic flow is doubled.

Fear and intimidation

- 1.3.50 IEMA guidelines (Ref. 1.20) note that a further impact traffic may have on pedestrians is fear and intimidation. The impact of this is dependent upon the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by factors such as narrow pavement widths.
- 1.3.51 In the absence of commonly agreed thresholds, the IEMA guidelines provide a set of thresholds that could be used as a first approximation of the likelihood of pedestrian fear and intimidations. The thresholds define the degree of hazard to pedestrians by average traffic flow, 24-hour HGV flow and average speed (mph) over a 24-hour day.

Driver delay

- 1.3.52 IEMA guidelines (Ref. 1.20) note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system.
- 1.3.53 An assessment of driver delay is provided in the **Transport Assessment** (Doc Ref. 8.5) and summarised in **Volume 2, Chapter 10** of the **ES**.

Accidents and safety

- 1.3.54 IEMA guidelines (Ref. 1.20) do not include any definition of significance in relation to accidents and safety, suggesting that professional judgement would be needed to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents. The full results of the accident analysis are reported in the **Transport Assessment** (Doc Ref. 8.5) and are summarised in **Volume 2, Chapter 10** of the **ES**.

Hazardous loads

- 1.3.55 The IEMA guidelines (Ref. 1.20) note that some developments may involve the transportation of dangerous or hazardous loads by road and that this should be recognised within an ES. These could occur either during construction or decommissioning phases of the development, in addition to movements associated with the operational phase.
- 1.3.56 Where this is likely to occur, the IEMA guidelines (Ref. 1.20) state that the ES should clearly outline the estimated number and composition of such loads. Where the number of movements is considered to be significant the ES should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event.

Summary of magnitude of impacts

1.3.57 For those links that are not screened out of the assessment using Rules 1, 2 and 3, the criteria set out in **Table 1.4** has been used to determine the magnitude of impacts. However, the absolute level of an impact is also important (e.g. the total flow of traffic or HGVs on a link) and comment is made on this in the analysis. In addition, it is important to note that some impacts assessed are not permanent but are temporary and this affects the magnitude attached to them.

1.3.58 The criteria for the assessment of magnitude are shown in **Table 1.4**.

Table 1.4: Assessment of magnitude of impact for transport

Impact	Magnitude of Impact.			
	Very low	Low	Medium	High
Severance	Change in total traffic of less than 30%.	Change in total traffic of 30–60%.	Change in total traffic of 60–90%.	Change in total traffic over 90%.
Driver and passenger delay.	A judgement based on analysis detailed in the Transport Assessment (Doc Ref. 8.5).			
Pedestrian, cyclist and equestrian delay.	Two-way traffic flow < 1,400 vehicles per hour.	A judgement based on the road links with two-way traffic flow exceeding 1,400 vehicles per hour in context of the individual characteristics.		
Pedestrian, cyclist and equestrian amenity.	Change in total traffic or HGV flows < 100%.	A judgement based on the routes with >100% change in context of their individual characteristics.		
Fear and intimidation.	18hr average of <600 veh/hr and <10 mph, <1,000 HGVs in 18 hr.	18hr average of 600–1,200 veh/hr and 10–15 mph, 1,000–2,000 HGVs in 18 hr.	18hr average of 1,200–1,800 veh/hr and 15–20 mph, 2,000–3,000 HGVs in 18 hr.	18hr average of 1,800+ veh/hr and 20+ mph, 3,000+ HGVs in 18 hr.
Accidents and safety.	A judgement based on analysis detailed in the Transport Assessment (Doc Ref. 8.5).			
Hazardous load	Based on risk assessment of potential for a collision to happen with a hazardous load.			

iii. Effect definitions

1.3.59 An effect is a measurable physical change in the principal environment arising from enabling, construction and operation activities.

- 1.3.60 As set out in Schedule 4 of the EIA Regulations, it is the effects – not the impacts – of a development which are to be reported in the **ES** (Doc Ref. Book 6). The effect of the Sizewell C Project on transport is determined with due regard to the sensitivity of the receptor and magnitude of impact.
- 1.3.61 The conceptual ‘source-pathway-receptor’ model approach has been used to identify potential effects, and the means by which these can manifest themselves on the environment and its sensitive receptors.
- 1.3.62 The definitions of transport effects and how they are classified are shown in **Table 1.5**.



Table 1.5: Classification of effects.

		Value / Sensitivity of Receptor			
		Very low	Low	Medium	High
Magnitude	Very low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

- 1.3.63 Following the classification of an effect as presented in **Table 1.5**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied, where appropriate.

g) **Assessment methodology**

i. **Establishing the baseline**

- 1.3.64 This section presents a description of the baseline environmental characteristics within the footprint of the Sizewell C Project and in the surrounding area.

- 1.3.65 An extensive range of information has been sought and tasks undertaken to define the baseline environment for the Sizewell C Project and likely receptors, including but not limited to:

- desk-based review of existing published data;
- data and reports provided by consultees; and
- field surveys and site investigation information.

Existing baseline

- 1.3.66 In order to determine existing traffic flows on the adjacent local highway network, traffic surveys were commissioned and have been undertaken over the last six years across Suffolk.

- 1.3.67 The baseline has been established through the modelling of current traffic flows using PTV-VISUM, an industry standard software package used for transport modelling. Base models were produced to reflect existing conditions, in a 2015 base year, from which forecast scenarios could be developed and used to assess the potential impacts of the Sizewell C Project. The models were developed following guidance set out in DfT's Transport Analysis Guidance (TAG) (Ref. 1.23).
- 1.3.68 VISUM traffic models were produced for seven individual hours as follows:
- 06:00–07:00.
 - 07:00–08:00.
 - 08:00–09:00.
 - 15:00–16:00.
 - 16:00–17:00.
 - 17:00–18:00.
 - 18:00–19:00.
- 1.3.69 The development, calibration and validation of the base year model is described in the Local Model Validation Report which is appended to the **Transport Assessment** (Doc Ref. 8.5).
- 1.3.70 The modelled hourly flows were converted to daily two-way traffic volumes using Annual Average Weekday Traffic (AAWT) conversion factors derived from local survey data.
- Future baseline**
- 1.3.71 The 2015 base models were subsequently used to develop a forecast year highway network and demand, representative of the likely traffic conditions in the three different forecast years (2023, 2028 and 2034), to enable analysis of the impacts of the Sizewell C Project traffic on the highway network during the early years, peak construction and operational stages of the Sizewell C Project.

- 1.3.72 These ‘reference case’ models were produced to represent future baseline flows in these forecast years, without the Sizewell C Project development traffic. The models include committed developments and highway infrastructure, as agreed with SCC, and background traffic growth. In addition, all future year scenarios have been modelled including traffic flows generated by an outage at Sizewell B, which is performed periodically (approximately every 18 months and lasting approximately 1–3 months), so that robust traffic flows are reflected in each scenario.
- 1.3.73 The reference case traffic modelling is described within the **Transport Assessment** (Doc Ref. 8.5).
- 1.3.74 In order to derive daily two-way traffic flows, the Sizewell B outage traffic flows were separated from the general traffic before AAWT factors were applied. AAWT factors for the Sizewell B outage traffic flows were derived from traffic surveys undertaken during an outage period in September 2016.

ii. Construction

Early years

- 1.3.75 Building on the 2023 reference case model, the early years scenario was produced to include the Sizewell C Project traffic generated during the early years of construction of the main development site and the associated development sites, without any highways mitigation in place.
- 1.3.76 In addition, traffic generated by the Sizewell B relocated facilities project has been included in this scenario as part of the Sizewell C Project traffic flows.
- 1.3.77 AAWT factors were applied separately for general traffic, Sizewell B outage traffic, and Sizewell C Project and Sizewell B relocated facilities traffic.
- 1.3.78 The Sizewell C Project and assessment of the 2023 early years model are described further within the **Transport Assessment** (Doc Ref. 8.5).

Peak construction

- 1.3.79 Building on the 2028 reference case model, the peak construction scenario was produced that includes the peak main development site traffic and operational associated development sites. On some days during the peak construction year, the number of HGV deliveries would be higher than on a typical day, so two scenarios have been assessed for the peak construction phase, representing a ‘typical day’ and a ‘busiest day’ with the only difference being the number of the Sizewell C Project HGVs.

1.3.80 In order to derive daily two-way traffic flows, separate AAWT factors were applied for the general traffic, Sizewell B outage traffic and the Sizewell C Project traffic. AAWT factors for the Sizewell C Project traffic were derived from analysis of the traffic generation in the seven modelled hours compared with daily traffic generation.

1.3.81 The development and assessment of the 2028 peak construction models are further described within the **Transport Assessment** (Doc Ref. 8.5).

iii. Operation

1.3.82 From the 2028 peak construction network, the 2034 operational scenario was developed. This scenario contains the 2034 reference case traffic plus Sizewell C Project operational traffic and associated infrastructure (some associated development sites will have been removed). The traffic generated during this stage of the Sizewell C Project would be lower than during construction, but traffic would be moving at different times of the day.

1.3.83 Similarly to the construction period assessments, in order to derive daily two-way traffic flows, separate AAWT factors were applied for the general traffic, Sizewell B outage traffic and the Sizewell C Project traffic.

1.3.84 The development and assessment of the 2034 operational model are further described within the **Transport Assessment** (Doc Ref. 8.5).

iv. Cumulative assessment

1.3.85 The 'cumulative' assessment includes quantitative traffic numbers generated by Scottish Power Renewables East Anglia One North and East Anglia Two, in the 2023 early years and 2028 peak construction scenarios only. The Scottish Power Renewable development would be completed by the time of the Sizewell C Project operation so a cumulative assessment has not been undertaken for this stage of the Sizewell C Project.

v. Inter-relationships

1.3.86 **Volume 2, Chapter 11** Noise and Vibration; **12** Air Quality, **15** Amenity and Recreation; **25** Radiological Considerations; **26** Climate Change (Doc Ref. 6.3); **Volumes 3 to 9, Chapter 5** Air Quality and **Chapter 8** Amenity and Recreation (Doc Ref. 6.4 to 6.10) within the **ES**, provide details on where the effects of traffic are considered further from the perspective of these topic assessments.

h) Assumptions and limitations

1.3.87 A number of assumptions have been made within the assessment, based on Hinkley Point C and other sources of data, which are detailed in **Chapter 7** of the **Transport Assessment** (Doc Ref 8.5) and include:

- Daily temporal profile of HGVs to and from the main development site;
- Split of HGVs between the HGV routes to/from the main development site;
- Split between home-based and non-home based workers;
- Distribution of construction workers car trips to the main development site and park and ride facilities;
- Shift pattern for construction workers;
- Bus timetable to coincide with shift pattern; and
- Direct bus routes based on gravity model and distribution of workers.

1.3.88 The following limitations have been identified:

- The main limitation related to the baseline conditions is the precision of traffic counts and how well they reflect typical conditions. The traffic surveys were undertaken in May 2015. May is a neutral month in accordance with Design Manual for Roads and Bridges, Volume 6 Section 2 Part 7 (Ref. 1.24). Consideration of the seasonal variation of traffic flows in the study area is presented within the **Transport Assessment** (Doc Ref. 8.5).

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VOLUME 1, CHAPTER 6, APPENDIX 6G: NOISE AND VIBRATION LEGISLATION AND METHODOLOGY

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Plates

None provided.

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None provided.

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Annex 6G.1 Noise & Vibration Policy, Guidance, Standards, Assessment Methodology and Criteria

Annex 6G.2 Prediction Method for Vibration and Groundborne Noise

1. Noise and Vibration Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant noise and vibration effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites, unless otherwise indicated in the topic chapters of the site assessment volumes (**Volumes 2 to 9**).

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in the following **ES** chapters:

- **Volume 2, Chapter 11**; and
- **Volumes 3 to 9, Chapter 4**.

1.1.3 The noise and vibration assessment has been informed by assumptions, details and related assessments as set out in the following chapters:

- **Volume 2, Chapters 2, 3, and 4** which describe the proposed development including the construction and operation of Sizewell C on the main development site;
- **Volumes 3 to 9, Chapter 2** which describe the construction, operation and removal and reinstatement (where applicable) of the associated development sites; and
- **Volume 2, Chapter 10** which presents the transport assessment, including the traffic modelling assumptions.

1.1.4 The scope of the noise and vibration assessment includes the assessment of potential impacts from construction, operation, and removal and reinstatement of the Sizewell C Project, where applicable. This also includes the assessment of noise and vibration from road traffic and rail traffic movements associated with the construction and operation of the Sizewell C Project.

1.1.5 The assessments as presented in the noise and vibration chapters of **Volumes 2 to 9** of the **ES** consider impacts on residential and other human receptors, such as schools, hospitals and offices.

1.1.6 The assessments of noise and vibration impacts on ecological receptors, including bird and bat species are detailed in the terrestrial ecology and

ornithology assessments presented in **Chapter 14** of **Volume 2** and **Chapter 7** of **Volumes 3 to 9** of the **ES**. The assessment of noise impacts on amenity and recreation (including tranquillity), for example on users of public rights of way, is detailed in the amenity and recreation assessments presented in **Chapter 15** of **Volume 2** and **Chapter 8** of **Volumes 3 to 9** of the **ES**. The potential impacts on heritage assets including a change in their setting arising from a change in the noise character or level, is detailed in the historic environment assessments presented in **Chapter 16** of **Volume 2** and **Chapter 9** of **Volumes 3 to 9** of the **ES**. The potential effects on marine ecological receptors (e.g. marine mammals) are detailed in the marine ecology assessment provided in **Chapter 22** of **Volume 2** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant noise and vibration effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the noise and vibration assessments as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 There is no international legislation and policy that is relevant to the noise and vibration assessment of the proposed development.

b) National

i. Legislation

1.2.4 Part III of the Control of Pollution Act 1974 (Ref. 1.1) gives local authorities powers to control noise from construction sites and enables developers to apply for prior approval for construction works. Section 72 defines what is meant by best practicable means and requires that regard be had to relevant codes of practice, one of which is British Standard BS 5228, as described below.

1.2.5 The Environmental Protection Act 1990 (Ref. 1.2), which deals with noise and vibration as a statutory nuisance (but does not directly apply to construction works), and which sets out requirements for certain prescribed industrial processes to be controlled (by environmental permits), primarily to control pollution other than noise and vibration.

1.2.6 The Environmental Permitting Regulations 2016 (Ref. 1.3) relate to the permitting of certain industrial processes for the purposes of pollution control.

1.2.7 The Noise Insulation Regulations 1975 (as amended 1988) (Ref. 1.4) and The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (Ref. 1.5) set out requirements for provision of sound insulation or grant for insulation, when noise levels are altered as a result of changes to or the construction of a new road or rail line.

ii. National Policy Statements

1.2.8 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref1.6) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref 1.7). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

1.2.9 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs set out specific criteria and issues that should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.

1.2.10 A summary of the relevant NPS EN-1 and NPS EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement.	How the Requirement has been Addressed.
EN-1 5.11.4.	<p>The applicant should include the following in the noise assessment:</p> <ul style="list-style-type: none"> a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; identification of noise sensitive premises and noise sensitive areas that may be affected; the characteristics of the existing noise environment; a prediction of how the noise environment will change with the proposed development; 	<p>Each of these matters have been included in the noise assessment and detailed in the ES noise and vibration chapters for the Sizewell C main development site (Volume 2 Chapter 11) and associated developments (Volumes 3 to 9 Chapters 4).</p>

Ref.	NPS Topic Requirement.	How the Requirement has been Addressed.
	<ul style="list-style-type: none"> • in the shorter-term such as during the construction period; • in the longer-term during the operating life of the infrastructure; • at particular times of the day, evening and night as appropriate; • an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and • measures to be employed in mitigating noise. 	
EN-1 5.11.5.	The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.	The effects of changes to road traffic is assessed and presented in Volume 2, Chapter 11 and where relevant in the associated development assessment chapters. The effects of noise impacts from changes in rail traffic movements is assessed and presented in Volume 9, Chapter 4 .
EN-1 5.11.6.	Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.	Operational noise and vibration has been assessed in accordance with the standards and guidance referred to, which is BS 4142, BS 6472 and BS 8233 as appropriate. Construction noise and vibration has been assessed in accordance with the standard referred to BS 5228. Further details on the approach to the noise and vibration assessments, and relevant British Standards and guidance used is detailed in this appendix and supporting annexes.
EN-1 5.11.7.	The applicant should consult the Environment Agency, Natural England, or the Countryside Council for Wales, as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.	The effects of noise and vibration on protected species and other wildlife are assessed in the terrestrial ecology and ornithology chapters of the ES (Volume 2, Chapter 14 and Volumes 3 to 9, Chapter 7) . Consultation on the assessment methods, outcomes and mitigation requirements has been undertaken with various consultees, including the Environment Agency and Natural England as part of the consultation on the Environmental Impact Assessment (EIA) and the

Ref.	NPS Topic Requirement.	How the Requirement has been Addressed.
		shadow Habitats Regulations Assessment (HRA).

1.2.11 There are no specific noise and vibration requirements in NPS EN-6.

iii. [National Planning Policy Framework 2019](#)

1.2.12 The National Planning Policy Framework (NPPF) 2019 (Ref. 1.8) sets out the Government's planning policy at a national level for England, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.13 **Volumes 2 to 9**, consider the noise and vibration impacts from the proposed development, having regard to potential effects on health, living conditions and potential sensitivities, and identifying measures to minimise impacts where possible. The amenity and recreation chapters set out assessments of potential noise impacts on tranquil areas.

iv. [Noise Policy Statement for England](#)

1.2.14 The Noise Policy Statement for England (NPSE) (Ref. 1.9) states three policy aims, as follows:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

1.2.15 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

1.2.16 Accordingly, where predicted levels are above the Lowest Observed Adverse Effect Level (LOAEL) and below the Significant Observed Adverse Effect Level (SOAEL), reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

1.2.17 It is important to recognise that the concept of the SOAEL is different from the declaration of significant adverse effects in an Environmental Statement. The requirement of NPS EN-1 is stated at paragraph 5.11.9:

“The IPC should not grant development consent unless it is satisfied that the proposals will meet, the following aims:

- avoid significant adverse impacts on health and quality of life from noise;*
- mitigate and minimise other adverse impacts on health and quality of life from noise; and*
- where possible, contribute to improvements to health and quality of life through the effective management and control of noise.”*

1.2.18 A similarly-worded set of aims is set out in the NPSE, subject to the Government’s policy on sustainable development:

- “avoid significant adverse impacts on health and quality of life;*
- mitigate and minimise adverse impacts on health and quality of life; and*
- where possible, contribute to the improvement of health and quality of life.”*

1.2.19 As set out elsewhere in this appendix, the concept of both SOAEL and LOAEL are expanded upon in planning guidance, but not defined numerically.

1.2.20 The requirements for the Environmental Statement in terms of terrestrial noise effects are set out in The Infrastructure Planning (Environmental

Impact Assessment) Regulations 2017. Schedule 4 *Information for inclusion in environmental statements* refers to:

“5. A description of the likely significant effects of the development on the environment resulting from, inter alia—

(a) the construction and existence of the development, including, where relevant, demolition works;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2).

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented,

reduced or offset, and should cover both the construction and operational phases.”

- 1.2.21 The method of identifying and quantifying the likely significant effects is not defined in the regulations; it is left to the applicant to define those methods.
- 1.2.22 Depending upon the classifications of effect adopted for the Environmental Statement, it is possible that likely significant negative or adverse effects may be declared, whilst noise levels remain below the SOAEL. This has been debated and established through the examination of other infrastructure projects, and through those decisions, it has been confirmed that the first aim of the NPSE / NPS EN-1 can be met even if significant adverse effects are identified in an Environmental Statement, as long as the SOAEL is avoided⁽¹⁾. Paragraph 1064 of the decision letter on the Cranford Agreement Appeal at Heathrow confirmed:

“I do not equate the “significant adverse effects” identified in the ES with those that the NPSE seeks to avoid.”

- 1.2.23 This separation of SOAEL and EIA significance reflects the difference between the requirement set out in paragraph 7 of Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, where a description is required of measures to “*avoid, prevent, reduce or, if possible, offset any identified significant adverse effects*”, and the requirement in policy to “*avoid significant adverse impacts on health and quality of life from noise*” and “*mitigate and minimise other adverse impacts on health and quality of life from noise*”.
- 1.2.24 The approach adopted in the this assessment is based on recently-issued guidance on road traffic noise⁽²⁾, which made clear that the SOAEL for road traffic noise was aligned with the threshold for noise insulation, or a grant for insulation, as set out in the Noise Insulation Regulations 1975 (as amended 1988), while the significance of effects was aligned to changes in road traffic noise level. There is interaction between the SOAEL and the significance thresholds, as the latter may be modified if the overall future road traffic noise levels fall above or below the stated SOAEL. However, the important principle that is established in Guidance in the Design Manual for Roads and Bridges (DMRB) Document LA111 is that the SOAEL exists as an identifiable noise level and the significance of effects is aligned to changes in noise level

⁽¹⁾These decisions include in particular: Secretaries of State's Decision Letter and Statement of Reasons dated 12 September 2014, and Examining Authority's Recommendation Report dated 12 June 2014, in respect of the Thames Tideway Tunnel; and Secretaries of State's Decision Letter dated 2 February 2017 and Inspector's Report dated 9 November 2015 in the appeal by Heathrow Airport Limited concerning the 'Cranford Agreement'.

⁽²⁾ Design Manual for Roads and Bridges, LA111 Noise and vibration, November 2019. Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (NI)

as a separate consideration. The assessment method set out in LA111 aligns with the planning decisions described above.

- 1.2.25 This recent clarification on the way that the SOAEL and separate impact magnitude categories work together in the assessment of road traffic noise has informed the wider SZC noise assessment, and other noise sources have been assessed in a way that aligns with the approach set out in LA111.

v. **Government's 25 Year Environment Plan**

- 1.2.26 The 25 year plan to improve the environment (Ref. 1.10) sets out the Government's goals for improving the UK environment over the next 25 years. Part of the plan involves the reduction of pollution, which includes effective management of noise. It aims to improve quality of life by reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces. It states that, *"reducing the noise impacts of motor traffic will directly benefit health, improve the ambience of street environments and encourage active travel and human interaction"*.

c) **Regional**

- 1.2.27 There is no relevant regional policy that is relevant to the noise and vibration assessment of the proposed development.

d) **Local**

- 1.2.28 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.29 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

- 1.2.30 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

- 1.2.31 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref. 1.11) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. **Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies**

1.2.32 Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies (Ref. 1.12) has no detailed noise policy, however within its Development Management Policy DM23 – Residential Amenity, it states:

“When considering the impact of new development on residential amenity, the Council will have regard to the following:

- (a) privacy/overlooking;*
- (b) outlook;*
- (c) access to daylight and sunlight;*
- (d) noise and disturbance;*
- (e) the resulting physical relationship with other properties;*
- (f) light spillage, air quality and other forms of pollution; and*
- (g) safety and security. Development will be acceptable where it would not cause an unacceptable loss of amenity to adjoining or future occupiers of the development.”*

ii. **Suffolk Coastal District Council Final Draft Local Plan**

1.2.33 The emerging Suffolk Coastal Final Draft Local Plan (Ref. 1.13) contains Policy SCLP4.3 which relates to the “Expansion and Intensification of Employment Sites”. This policy requires:

“Proposals to expand, alter or make productivity enhancements to existing employment premises will be permitted unless:

- a) The scale of development would cause a severe impact on the highway network; or*
- b) There will be a material harm to the environmental sustainability in the area; or*
- c) The proposed use is not compatible with the surrounding employment uses in terms of car parking, access, noise, odour and other amenity concerns; or*
- d) There is harm to the amenity and living conditions of local residents and businesses relating to matters of noise, vibration, dust and light; and*
- e) Potential adverse impacts cannot be successfully mitigated.”*

e) Guidance

i. Planning Practice Guidance

- 1.2.34 This online resource, published by the UK Government, and regularly updated, provides guidance on interpretation and implementation of English planning policy. Amongst other matters, it advises on how planning can manage potential noise impacts in new development.
- 1.2.35 The “Planning Practice Guidance on Noise” (Ref. 1.14) was originally published online in March 2014 with the most recent version issued in July 2019. It reinforces the policy discussed in the NPPF, NPSE and NPSs and seeks to define a person’s perception at different effect levels using the following definitions:
- NOEL (No Observed Effect Level);
 - LOAEL (Lowest Observed Adverse Effect Level); and
 - SOAEL (Significant Observed Adverse Effect Level).
- 1.2.36 It is notable that the Planning Practice Guidance (PPG) describes the NOEL as *“noise can be heard, but does not cause any change in behaviour attitude or other physiological response”*, whereas at a LOAEL *“noise can be heard and causes small changes in behaviour, attitude, or other physiological response e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life”*. The former is described as “present and not intrusive” whereas the latter is described as “present and intrusive”.
- 1.2.37 A “significant” effect is described as “present and disruptive” resulting in *“a material change in behaviour attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area”*.
- 1.2.38 The PPG also introduces the concept of an unacceptable adverse effect level (UAEL), which sits above the significant observed adverse effect. This suggests that there are gradations of effect above the SOAEL.
- 1.2.39 The PPG provides a hierarchy of planning actions required for different effects of noise. Between LOAEL and SOAEL the recommended action is to

mitigate noise and reduce to a minimum. At SOAEL the action recommended is to avoid.

- 1.2.40 These are the same terms used in the NPS and NPSE. Once the unacceptable adverse effect is reached, the recommended action is to prevent; the UAEL is not referenced in planning policy, i.e. it does not appear in the NPSs or the NPSE, only in the PPG. Since it is not a policy requirement, the UAEL is not referenced in the assessments.

ii. Summary of Guidance

- 1.2.41 This assessment has been undertaken in accordance with the following guidance documents:

- World Health Organisation Guidelines for Community Noise 1999 (Ref. 1.15);
- World Health Organisation Regional Office for Europe Environmental Noise Guidelines for the European Region 2018 (Ref. 1.16);
- World Health Organisation ‘Night noise guidelines for Europe’ 2009 (Ref. 1.17);
- Guidance in the Design Manual for Roads and Bridges (DMRB) Document LA111 (Ref. 1.18);
- British Standard BS 8233: 2014 – Guidance on sound insulation and noise reduction for buildings (Ref. 1.19);
- British Standard BS 5228-1 Noise: 2009+A1: 2014 – Code of Practice for noise and vibration control at open construction sites – Noise (Ref. 1.20);
- British Standard BS 5228-2 Vibration: 2009+A1: 2014 – Code of Practice for noise and vibration control at open construction sites – Vibration (Ref. 1.21);
- British Standard BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting (Ref. 1.22);
- Calculation of railway noise (CRN) (Ref. 1.23);
- Calculation of road traffic noise (CRTN) (Ref. 1.24);

- British Standard BS 4142: 2014+A1: 2019 – Methods for rating and assessing industrial and commercial sound (Ref. 1.25);
- Institute of Environmental Management and Assessment (IEMA) Guidelines for environmental noise impact 2014 (Ref. 1.26);
- Association of Noise Consultants (ANC) Measurement and assessment of groundborne noise and vibration 2011 (Ref. 1.27);
- British Standards BS 7385-2: 1993 - Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration (Ref. 1.28).

1.2.42 The relevant guidance from each of these documents is discussed in detail in **Annex 6G.1**.

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6**.

1.3.2 This section provides a summary of the noise and vibration assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as its removal and reinstatement, where applicable. Any site-specific additions to the methodology for noise and vibration are described within the relevant chapter of **Volumes 2 to 9**.

1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6C** of this volume.

1.3.4 Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

1.3.5 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees Suffolk County Council (SCC) and Suffolk Coastal District Council (SCDC), which has become part of East Suffolk Council (ESC) throughout the design and assessment process. A summary of the general comments raised and EDF Energy's responses are detailed in **Table 1.2**. Specific comments on the

assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the noise and vibration assessment.

Consultee	Date	Summary of Discussion/Comments.
SCC and SCDC (now ESC).	15 December 2015.	Discussion of approach to assessment work, including proposed assessment criteria and details of baseline surveys. This included discussion of preferred approach to rail and road.
SCC and SCDC (now ESC).	28 July 2016.	Discussion on criteria and consideration of LOAELs and SOAELs for road traffic noise, main development site construction noise, rail, campus and associated development sites. Also, discussion of operational noise from power station in the context of low background levels in the area.
SCC and SCDC (now ESC).	15 March 2019.	EDF Energy presented an overview of the following points: <ul style="list-style-type: none"> • assessment approach; • previous consultations; • baseline survey work; • summary of assessment work and findings at Stage 3 consultation; and • work plan for 2019. Discussion also included the following: <ul style="list-style-type: none"> • revision to assessment criteria as a result of recent changes to guidelines; and • plans for community liaison and monitoring during construction.
	9 May 2019.	EDF Energy provided a detailed explanation showing how the proposed assessment criteria were derived, with references provided to relevant guidance and standards, as requested by ESC/SCC. Detailed discussion of proposed road traffic criteria was also undertaken.
	19 June 2019.	This purpose of this meeting was to discuss: <ul style="list-style-type: none"> • the predictions of noise levels from the main development site during construction. • the methodology for how the noise levels were predicted as well as the outputs for different receptors / receptor groups to the north and west of the main development site for each phase of construction. • an overview of additional baseline survey work in 2019 relating to the main development site, road and rail networks and associated development sites.

Consultee	Date	Summary of Discussion/Comments.
		ESC requested a list of construction noise source data, including sound power levels and equipment on times assumed for each phase. This information was provided on 21 August 2019.
	22 August 2019.	Discussions were focussed on baseline monitoring and main development site construction noise predictions, covering earlier presentations in greater detail. EDF Energy presented further details on these, including plans showing all baseline survey locations.

1.3.6 Following engagement with ESC between 2015 and 2019, SZC Co. has refined the assessment criteria to take account of current planning policy and updated technical guidance, as set out in paragraphs 1.2.16 to 1.2.24.

c) Study area

1.3.7 The only guidance document which suggests distances to use to define a study area for noise and vibration is LA111 (Ref. 1.18). This recommends a study area which covers up to 300m for the assessment of noise from the construction of a proposed new road and up to 600m for the assessment of noise from its operation. For the assessment of the changes to road traffic as a result of construction traffic (for a new road scheme), it recommends a study area extending up to 50m from the kerb of an affected road. These distances have been used for the assessment of noise from new road schemes.

1.3.8 For other study areas, the approach taken has been to include all noise and vibration sensitive receptors that are potentially affected by noise or vibration from the proposed development and all noise or vibration sensitive receptors in areas where there is a reasonable stakeholder expectation that a noise or vibration assessment will be undertaken. Professional judgement has been used to determine the areas in each case.

1.3.9 The study area for the main development site and associated development sites includes all human receptors identified around the site which have the potential to be affected by noise on account of their proximity, as well as areas identified within the amenity and recreation assessment as potentially important for their quiet character. No set distance has been used, as this would have limited the area considered and some locations further afield where there is a reasonable expectation that a noise or vibration assessment would be undertaken may not have been included.

1.3.10 Similarly, permanent residential accommodation in the vicinity of the proposed rail crossings, upgrades and other improvements; the proposed

highway improvements; and the proposed freight management facility have been included within the study areas around these sites based on locations at which there would be a reasonable expectation that an assessment would be carried out, ensuring that all receptors outside of the study area would be exposed to no greater than negligible levels.

- 1.3.11 The study area for the evaluation of changes to road traffic noise on existing roads includes the A12 en route to Sizewell (between Ipswich to the south and Lowestoft to the north) and on the B1122 as the main access road to the main development site from the A12. Other roads in the vicinity of the construction site that are likely to experience some increases in car traffic are also be considered as appropriate. Noise sensitive receptors within 50m of affected existing roads are considered, following the guidance in LA111.
- 1.3.12 Potential noise and vibration impacts arising from Sizewell C-related rail freight movements on the Saxmundham to Leiston branch line and the East Suffolk Line have also be considered. Noise sensitive receptors within 300m of affected rail lines are considered.
- 1.3.13 For other sites, noise and vibration predictions have been made out to a distance at which effects would be negligible.
- 1.3.14 The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the noise and vibration chapters of the relevant volumes of the **ES (Volume 2 to 9)**.

d) Assessment scenarios

- 1.3.15 Noise and vibration effects have been predicted during construction, operation and, where applicable, removal and reinstatement. Where appropriate, construction activity has been divided into phases to help to describe the effects of different periods and types of activities.
- 1.3.16 Road traffic noise effects for new road schemes are considered for the peak construction year (2028) and the first year that the road would operate once the work on the main development site is complete (2034). Typical changes to road traffic flows during construction which have the potential to result in noise effects on the existing road network are assessed during early years (which, in general, is 2023) and peak construction (2028). The busiest period within 2028 is also assessed as an additional scenario for both new roads and existing roads.

e) Assessment criteria

- 1.3.17 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the proposed main development site and proposed

associated developments would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

- 1.3.18 A summary of the assessment criteria used in the noise and vibration assessment is presented in the following sub-sections. **Annex 6G.1** provides a detailed explanation of how each set of criteria was derived.

i. Sensitivity

- 1.3.19 The criteria used in noise and vibration assessment for determining the sensitivity of receptors are set out in **Table 1.3**.

Table 1.3: Assessment of the value or sensitivity of receptors for noise and vibration.

Sensitivity	Description
High	Receptors that are highly sensitive to noise or vibration such as theatres, auditoria, recording studios, concert halls and highly vibration sensitive structures or uses such as certain laboratories medical facilities or industrial processes.
Medium	Noise and vibration sensitive receptors such permanent residential buildings, hospitals and other buildings in health/community use, buildings in educational use, hotels and hostels.
Low	Receptors with limited sensitivity to noise and vibration such as offices, libraries buildings in religious use, and other workplaces with a degree of sensitivity due to the need to concentrate.
Very Low.	Receptors of very low sensitivity to noise and vibration such as industrial or commercial buildings and transient or mobile receptors.

- 1.3.20 It is noted that the sensitivity categories adopted in the Sizewell C Project assessments range from 'very low' to 'high'; other assessments may adopt different category labels where, for instance, residential receptors are classified as 'high' rather than 'medium', and an additional category of 'very high' would be identified. The categorisation does not affect the assessment outcomes, since the combination of receptor sensitivity and impact magnitude is aligned accordingly in the classification of effects table (**Table 1.17**).

- 1.3.21 Where noise has the potential to affect other receptors, particular sensitivities have been addressed within the particular chapter in which it is relevant, as follows:

- Terrestrial ecological and ornithological receptors (e.g. bat and bird species): **Volume 2 Chapter 14** and **Volumes 3 to 9 Chapter 7**.

- Amenity and recreation receptor (e.g. users of recreational resources): **Volume 2 Chapter 15** and **Volumes 3 to 9 Chapter 8**.
- Historic environment receptors (e.g. built heritage): **Volume 2 Chapter 16** and **Volumes 3 to 9 Chapter 9**.
- Marine ecological receptors (e.g. marine mammals): **Volume 2 Chapter 22**.

ii. Magnitude

- 1.3.22 The magnitude of change is described using different, method-specific approaches in accordance with guidance and standards and tables have been produced to equate levels (or changes in levels) to magnitudes for each different sensitivity receptor. Detailed descriptions of the derivations of these tables are in **Annex G6.1**.

Construction noise

- 1.3.23 The approach taken to evaluate noise effects for all construction work associated with the project on occupiers of dwellings and other permanent residential accommodation is that outlined in Part 1 of BS 5228. This recommends that, for dwellings, significant effects may occur when the site noise level, rounded to the nearest decibel, exceeds the value listed in **Table 1.4**. The table is used as follows: for the appropriate period (daytime, evening, night-time, weekends), the pre-construction ambient noise level is determined and rounded to the nearest 5 dB. This rounded value is compared to the Category A criteria in **Table 1.4** and depending on whether the rounded values are below, equal to, or above the Category A values, the Category A, B or C criteria will apply to the construction works as an indicator of significant effects.
- 1.3.24 The site construction noise levels are compared to those derived criteria and a potential significant effect is deemed to occur where the derived criteria are exceeded.
- 1.3.25 Although guidance on levels and significance provided in Part 1 of BS 5228 is designed specifically for use for dwellings, it will also be applied for other permanent residential accommodation and also for low sensitivity receptors in the vicinity of construction work. It is acknowledged that this may overstate the adverse effect from construction noise in certain circumstances, however, there are no other construction noise criteria that could apply for non-residential receptors.

Table 1.4: Thresholds of potential significant effect at dwellings, from Part 1 of BS 5228³

Period	Assessment Category		
	A	B	C
Day: Weekdays, 0700-1900, Saturday, 0700-1300	65 dB L _{Aeq,T}	70 dB L _{Aeq,T}	75 dB L _{Aeq,T}
Evenings and weekends: Weekdays 1900-2300, Saturdays 1300-2300 Sundays 0700 - 2300	55 dB L _{Aeq,T}	60 dB L _{Aeq,T}	65 dB L _{Aeq,T}
Every day 2300 - 0700	45 dB L _{Aeq,T}	50 dB L _{Aeq,T}	55 dB L _{Aeq,T}

1.3.26 A significant effect is deemed to occur where the relevant criterion is exceeded for the following periods of time:

- 10 or more days or nights in any 15 consecutive days or nights; or
- a total number of days or night exceeding 40 in any 6 consecutive months.

1.3.27 Where an assessment conclusion identifies a significant effect, it is on the basis that the effect is assumed to meet both the noise level criteria and the duration criteria, unless otherwise stated. Where there is uncertainty as to whether the duration criteria will be met, a precautionary approach has been

³ Notes: Assessment Category A: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are less than these values; Assessment Category B: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are the same as category A values; and Assessment Category C: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are higher than category A values. If the ambient sound level exceeds the Assessment Category C threshold values given in the table (i.e. the ambient sound level is higher than the above values), then an impact is deemed to occur if the total L_{Aeq,T} sound level for the period increases by more than 3 dB due to construction activity.

adopted and it is assumed that the works will continue for a sufficient period to meet the duration criteria.

- 1.3.28 The values to be used to assess the magnitude of impact from construction noise, other than the main development site are as shown in **Table 1.5** below.

Table 1.5: Values to be used to assess the magnitude of impact for construction noise from all sites other than the main development site

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium and low	Day	Below baseline values	Baseline noise levels	ABC ⁽¹⁾ (2)	ABC ⁽¹⁾ (2) + 10	L _{Aeq} , 12h, dB
	Evening					L _{Aeq} , 4h, dB
	Night					L _{Aeq} , 8h, dB
Very low	Any	Bespoke assessment method to be used				

(1) Note ABC indicates the significance threshold from **Table 1.4** above, based on the “ABC method” from BS 5228-1

(2) Note Where levels are predicted as free field values, the ABC criteria are reduced by 3dB, to account for the difference between free field and façade levels

- 1.3.29 A number of local factors in relation to construction and other noise sources from the main development site during construction work suggest the adoption of an alternative set of criteria for receptors potentially affected by these sources during construction. The values to be used to assess the magnitude of impact for construction work from construction and other sources within the main development site, including the land to the east of Eastlands industrial estate (LEEIE) (other than mechanical services) during the construction period are as shown in **Table 1.6**.

Table 1.6: Values to be used to assess the magnitude of impact for construction noise and other sources (other than mechanical services) at the main development site during construction (all values are free field)

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	Below baseline noise levels	Baseline noise levels	>60	>70	L _{Aeq, 16h} , dB,
	Night			>45	>55	L _{Aeq, 8h} , dB,
		<60	60	>65	>70	L _{Amax} , dB,
Low	Day	Below baseline noise levels	Baseline noise levels	>60	>70	L _{Aeq, 16h} , dB,
	Night			>45	>55	L _{Aeq, 8h} , dB,

Very low	Any	No assessment normally required
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Note: These levels only apply to construction noise from the main development site. Where construction work at other sites are considered within the main development site chapter (Volume 2, Chapter 11), for example the Fen Meadows and Sports Pitches at Leiston Sports Centre, these are considered using the thresholds in Table 1.5.

Construction vibration

1.3.30 The assessment of magnitude of construction vibration uses the criteria in Table 1.7.

Table 1.7: Values used to assess the magnitude of vibration impact from all construction sources (day or night)

Sensitivity of receptor	Magnitude of impact				Parameter
	Very low	Low	Medium	High	
High	Bespoke assessment method to be used				
Medium and low	<0.3	0.3	1	>10	PPV mm/s
Very low	No assessment normally required				

1.3.31 Construction vibration will be considered significant if the magnitude of impact is medium or high at a medium or high sensitivity receptor and occurs for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or
- a total number of days or nights exceeding 40 in any 6 consecutive months.

1.3.32 As with the assessment of construction noise, where an assessment conclusion identifies a significant effect, it is on the basis that the effect is assumed to meet both the vibration level criteria and the duration criteria, unless otherwise stated. Where there is uncertainty as to whether the duration criteria will be met, a precautionary approach has been adopted and it is assumed that the works will continue for a sufficient period to meet the duration criteria.

Operational power station and other mechanical services assessment criteria

1.3.33 To assess noise from the operational power station; mechanical ventilation plant; chillers and heating systems associated with the operation of the associated development sites and campus facilities, guidance within BS 4142 will be used to determine significance. BS 4142 states that, to consider the effects of noise from such plant, subtracting the background sound level from the rating noise level, where both are determined in accordance with the procedures set out in that standard, will give the following initial outcomes:

“A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.”

“A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.”

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

1.3.34 Once the level difference is established, this must be considered in context, as described in BS 4142, to decide the overall significance.

1.3.35 Based on this approach, the initial magnitude of impact is defined by the difference between the rating and background sound levels as shown in **Table 1.8**, prior to any consideration of context. “BG” in this table is shorthand for background sound level, L_{A90} , dB, assessed in accordance with the procedures in BS 4142. Day is taken to be 07:00 to 23:00 hours and night is 23:00 to 07:00 hours.

Table 1.8: Values to be used to assess the magnitude of impact for operational power station and other mechanical services (all values are free field).

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium or Low	Day	<BG+0*	BG+0*	BG+5*	BG+10*	L _{Ar} 1 hour, dB
	Night					L _{Ar} 15 mins, dB
Very low	Any	No assessment normally required				

* All assessments of significance must be considered in the context in which the sound occurs, in accordance with the guidance in BS 4142: 2014+A1: 2019.

1.3.36 The scope of BS 4142 states that it is to be used “to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”. As such, no guidance is available for the assessment of sound from these types of noise source on receptors with other sensitivities. Since high sensitivity receptors would be so due to specific and potentially unique circumstances, the assessment of this type of noise source on these receptors will be considered using a bespoke method, relevant to local circumstances. Noise from these types of source is unlikely to have an adverse effect on receptors with very low sensitivity, such as industrial and commercial buildings, and there are no standards which suggest suitable criteria for these circumstances.

1.3.37 Since people in low sensitivity receptors, such as offices, may be adversely affected by these sound sources and there are no alternative criteria that would apply, a precautionary approach has been taken, to use the same assessment criteria for the assessment of impact magnitude for both medium and low sensitivity receptors.

1.3.38 In general, background and ambient noise levels in the vicinity of the main development site are low and the absolute level of sound needs to be considered when looking at context in this situation. BS 4142 advises that:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

1.3.39 Therefore, where background noise levels are at or below 30dB, L_{A90} , an adverse effect would not occur below an absolute threshold that represents the onset of an adverse impact. Since this would only occur in locations where the existing levels are low, it is appropriate to select a level below which there is a very little likelihood of sleep disturbance for this at night. According to the WHO’s ‘Night Noise Guidelines for Europe’ (Ref. 1.17), there is “no sufficient evidence that the biological effects observed at the level below 40 dB $L_{night, outside}$ are harmful to health”. On this basis, a value of 40 dB, L_{night} represents a level above which an adverse effect might begin to occur in locations with low background at night.

Noise from car parks, security areas (other than those at the main development site), park and ride operations, campus activities, and other similar activities

1.3.40 **Table 1.9** shows the magnitudes of impact for receptors of different sensitivity for noise from activities in car parks, security areas (other than those at the main development site), campus activities, freight management facilities, operational level crossings and off-site sports facilities.

1.3.41 These activities, which do not fall under what might be considered ‘construction’ activities, are typically those associated with vehicle movements, the operational use of facilities, or operational equipment that might not otherwise be covered by the provisions for fixed mechanical and electrical plant.

1.3.42 These activities are expected to occur at the associated development sites, at off-site facilities, or at the proposed level crossings upgrades. They are termed ‘*general activities*’ in the title of table below, however, where the table used in a specific assessment chapter, the title will relate to the facility or activity covered by the criteria for that assessment.

Table 1.9: Magnitudes of impact for receptors of different sensitivity for general activity noise (excludes main development site) (all values are free field).

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	<50	50	55	60	L _{Aeq, 16h} , dB
	Night	<40	40	45	55	L _{Aeq, 8h} , dB
		<60	60	65	70	L _{Amax} , dB
Low	Day or night	<55	55	60	65	L _{Aeq, 8h} , dB
Very low	Any	No assessment normally required				

1.3.43 It is important to note that the criteria in **Table 1.9** do not apply to any similar activities within the main development site, including the LEEIE, that form part of the construction works; all construction activities and ‘general’ activities undertaken at the main development site fall under the site-specific construction noise criteria as set out in **Table 1.6**.

1.3.44 A single set of criteria have been adopted for construction works at the main development site, including the LEEIE, to avoid setting a range of source-specific criteria where there is a reasonable expectation that various sources will be active in close proximity to each other. Seeking to apply a range of criteria for different sources was considered to be problematic in terms of both assessment and on-site noise control.

Road traffic noise

1.3.45 The magnitudes of changes in road traffic noise are determined according to **Tables 1.10** and **1.11** below for short term (opening year) and long term (future year) effects respectively.

Table 1.10: Short term magnitude of changes in road traffic noise level – new road schemes

Short term magnitude	Short term noise change (dB L _{A10,18hr} or L _{night})
Major or high	Greater than or equal to 5.0
Moderate or medium	3.0 to 4.9
Minor or low	1.0 to 2.9
Negligible or very low	less than 1.0

Table 1.11: Long term magnitude of changes in road traffic noise level – new road schemes

Long term magnitude	Long term noise change (dB L _{A10,18hr} or L _{night})
Major or high	Greater than or equal to 10.0
Moderate or medium	5.0 to 9.9

Long term magnitude	Long term noise change (dB $L_{A10,18hr}$ or L_{night})
Minor or low	3.0 to 4.9
Negligible or very low	less than 3.0

- 1.3.46 LA111 treats short term as the first year of operation of a road and long terms as a year between the opening of a road and the 15th year after opening.
- 1.3.47 For noise sensitive receptors where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, local circumstances must also be considered to determine the final significance, as required by LA111.
- 1.3.48 The effect of construction road traffic on existing roads is considered using the values in **Table 1.12**.

Table 1.12: Magnitude of changes in road traffic noise level on existing roads due to Sizewell construction traffic

Magnitude of impact	Increase in traffic noise as a result of construction traffic (dB)
Major or high	Greater than or equal to 5.0
Moderate or medium	Greater than or equal to 3.0 and less than 5.0
Minor or low	Greater than or equal to 1.0 and less than 3.0
Negligible or very low	Less than 1.0

- 1.3.49 The assessment of the long term effects of changes in road traffic flows on surrounding roads during the operation of Sizewell C nuclear power station is assessed in the same way as the change during construction traffic on the existing road network except that the magnitudes of these changes have been considered against the values for long term effects set out in **Table 1.11**.
- 1.3.50 The criteria used for assessment of road traffic noise refer only to medium sensitive receptors. Where high sensitivity receptors exist, these would be considered on a case-by-case basis, dependent on the reason for the high sensitivity.

Rail noise

- 1.3.51 The impact scale adopted for the assessment of changes in rail traffic noise is shown in **Table 1.13**. The categories have been related to the guidance in the NPPF, NPSE and the PPG for noise and apply to residential, or medium sensitivity, receptors. Where the resultant noise level from a change is below a threshold at which an adverse effect might begin to occur, the effect would

be negligible, so the values in **Table 1.13** only apply where the resultant “with development” levels are above this threshold. Adopting precautionary approach, the categories are considered to also apply to low sensitivity receptors.

- 1.3.52 It may be appropriate to adopt the same categories for high sensitivity receptors, however these should be judged on a case-by-case basis.

Table 1.13: Impact scale for comparison of future railway noise against existing railway noise

Change in Noise Level dB(A)	Subjective Response	Magnitude of Impact
0	Not present	No change*
0.1 to 0.9	Unlikely to be noticeable	Very low*
1.0 to 2.9	Present but unlikely to be intrusive	Low*
3.0 to 9.9	Present and potentially intrusive, particularly at higher end of scale	Medium*
10.0+	Present and disruptive	High*

*Note: Where the resultant noise level is below a low threshold of effect (see **Table 1.14**), then the effect would be negligible, irrespective of the magnitude of change.

- 1.3.53 In addition to the use of the impact scale set out in **Table 1.13** to assess the potential impact of changes in railway noise on existing lines, consideration has been given to short duration or peak event noise. At night, the L_{Amax} criteria from **Table 1.14** below would apply in addition to the assessment criteria in **Table 1.13** for freight movements to and from the main development site on the East Suffolk Line during construction.

Table 1.14: Thresholds for magnitude of impact for new or altered railway lines at different sensitivities (all values are free field).

Sensitivity of receptor	Period	Magnitude of impact ⁽¹⁾				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	<50	50 ⁽²⁾	60	66	L _{Aeq, 16h} , dB
	Night	<40	40 ⁽²⁾	55	59	L _{Aeq, 8h} , dB
		<60	60 ⁽²⁾	70	77	L _{Amax} , dB
Low	Day or night	<50	55 ⁽²⁾	65	66	L _{Aeq, 8h} , dB
Very low	Any	No assessment normally required				

Notes: ⁽¹⁾ Consideration of the scale of any changes in railway noise should also be considered, where there is existing railway noise

⁽²⁾ These are the values to use for the lowest threshold of effect referred to in **Table 1.13**.

Rail vibration and groundborne noise during operation

- 1.3.54 The magnitude of impact of vibration from rail movements has been assessed against the criteria set out in **Table 1.15**, which are based on the criteria set out in BS 6472-1. Since the criteria relate to residential receptors, i.e. medium sensitivity receptors, receptors with high sensitivity would need a bespoke assessment, taking account of specific sensitivities and local circumstances.

Table 1.15: Magnitude of impact from railway vibration.

Sensitivity of receptor	Period ⁽¹⁾	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Bespoke assessment method to be used					VDV m/s ^{1.75}
Medium	Day	≤0.2	0.2-0.4	0.4-0.8	>0.8	
	Night	≤0.1	0.1-0.2	0.2-0.4	>0.4	
Low	Day	≤0.4	0.4-0.8	0.8-1.6	>1.6	
	Night	Night time assessment not normally required				
Very low	Day	≤0.8	0.8-1.6	1.6-3.2	>3.2	
	Night	Night time assessment not normally required				
Note: ⁽¹⁾ – day is 0700 to 2300 hours and night is 2300 to 0700 hours.						

- 1.3.55 The criteria set out in **Table 1.15** apply at the point of entry into the human body, i.e. within the affected properties, and where appropriate, consideration has been given to appropriate transfer functions.

- 1.3.56 The potential impact of groundborne noise from rail movements has been assessed against the criteria set out in **Table 1.16**.

Table 1.16: Magnitude of impact from groundborne noise due to railway movements – internal values.

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Bespoke assessment method to be used					L _{ASmax} , dB
Medium	Any	<35	35	45	50	
Low	Any	<35	35	45	50	
Very low	Any	Assessment not normally required				

- 1.3.57 In addition to the potential effect on human receptors, consideration has been given to the potential for building damage, as a result of railway vibration. Guidance in British Standard BS5228-2 (Ref. 1.21) concerning the potential impact of vibration on buildings refers to British Standard BS7385-2 (Ref. 1.28) and this relates to both "transient" and "continuous" exposure to vibration from a variety of sources (and their related

frequencies). In the case of both rail and construction generated vibration, the main frequency will be above 15Hz and thus, according to this guidance, a threshold at which minor cosmetic damage may start to occur is 20mm/s Peak Particle Velocity (PPV).

- 1.3.58 The meaning of continuous in this guidance relates to sources which last sufficiently long that they could lead to some resonance. Therefore, although any rail and construction generated vibration would be short-lived and intermittent, as some such vibration could cause resonance, it should be considered as continuous for the purposes of the guidance in these standards.
- 1.3.59 The guidance in these standards suggests that the guideline value be reduced by up to 50% if a source is continuous. Therefore, to provide a robust threshold level for the assessment of both rail and construction vibration for structures of medium or lower sensitivity, a precautionary value of 10 mm/s, PPV has been used.

iii. Classification of effects

- 1.3.60 Following the classification of the magnitude of the impact and the value/sensitivity of the receptor/feature, the effect is classified as shown in **Table 1.17** below. Definitions of each of the different levels of effect, which can be adverse, beneficial or neutral are shown in **Table 1.18**.

Table 1.17: Classification of effects

		Value/Sensitivity of Receptor			
		Very Low	Low	Medium	High
Magnitude	Very low	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

Table 1.18: Effect definitions – beneficial and adverse

Effect	Description
Major	The noise causes a material change in behaviour attitude or other physiological response. Adverse change may result in the potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished or improved due to change in acoustic character of the area.
Moderate	Effects that may result in moderate changes in behaviour, attitude or other physiological response. Adverse effects may result in some reported sleep disturbance. Changes to the acoustic character of the area such that there is a perceived change in the quality of life.

Effect	Description
Minor	Effects that may result in small changes in behaviour attitude or other physiological response. Adverse effects may result in some minor reported sleep disturbance. Small changes to the acoustic character of the area such that there is a low perceived change in the quality of life.
Negligible	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.

1.3.61 It is noted that, for high sensitivity receptors, which in this assessment are those uses that may be more sensitive than residential receptors as a result of their specific and particular requirements or needs, the classification of effects runs from ‘negligible’ to ‘moderate’, without having an intervening ‘minor’ effect. This approach has been adopted as it is considered that even a low impact at a high sensitivity receptor has the potential to be a significant adverse effect.

1.3.62 A very low impact, which in this context may be aligned with ‘no impact’, is the only impact magnitude that is considered to have no effect for a high sensitivity receptor, hence the ‘negligible’ effect. It is considered that this is a precautionary approach.

1.3.63 Following the classification of an effect as detailed in **Tables 1.17** and **1.18**, a clear statement is made as to whether the effect is ‘significant’ or ‘not significant’. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate. In addition to considering these tables, other project-specific factors need to be considered where these have a potential bearing on significance, for example the number of receptors affected, and the duration and character of the impact.

iv. Use of LOAEL and SOAEL values in the assessment

1.3.64 The NPSE, the NPSs and the PPG require the assessment of noise and vibration against the lowest observed adverse effect levels (LOAEL) and the significant observed adverse effect level (SOAEL). These will differ depending on variables such as the level and character of the noise or vibration source, receptor sensitivity, timings of when it would occur, its duration, existing sounds present and the frequency of the occurrence of the source. Each source type requires its own specific value for LOAEL and SOAEL, which depends on these factors.

1.3.65 Each different source type requires its own specific value for LOAEL and SOAEL, which depends on these factors. The methodology for assigning

significance differs from the general methodology set out in **Volume 1 Chapter 6**, as it does not allow for these variables to be properly considered. Each source has therefore been considered separately and values for LOAEL and SOAEL defined for different sensitivities.

- 1.3.66 In line with the NPSE, the concept of LOAEL, and SOAEL has been established for the assessment of noise and vibration generating activities associated with the proposed main development site, and proposed associated developments. **Table 1.19** sets out descriptions for and actions recommended in relation to these categories.

Table 1.19: Generic effect descriptions and actions recommended.

Effect	Description	Action
Below LOAEL.	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No specific measures required.
Between LOAEL and SOAEL.	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Mitigate and reduce to a minimum.
Above SOAEL.	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Avoid

- 1.3.67 Actual values for the noise and vibration sources assessed vary, dependent on the source of noise, as recommended in the various noise assessment standards and sources of guidance.
- 1.3.68 The descriptions and actions recommended in **Table 1.19** are based on the guidance in the NPSE (Ref. 1.9) and associated guidance in the PPG (Ref. 1.14). This approach was discussed meetings with the local authorities between 2015 and 2019.
- 1.3.69 For construction noise, the LOAEL is considered to be equal to the existing baseline ambient level. SOAEL values are as shown in **Table 1.20**.

Table 1.20: SOAEL values from all construction noise associated with the Sizewell C Project (all values are façade levels)

Day	Time (hours)	Averaging Period T	Significant Observed Adverse Effect Level ¹ L _{Aeq,T} (dB)
Mondays to Fridays	0700 – 0800	1 hour	70
	0800 – 1800	10 hours	75
	1800 – 1900	1 hour	70
	1900 – 2300	4 hours	65
Saturdays	0700 – 0800	1 hour	70
	0800 – 1300	5 hours	75
	1300 – 1400	1 hour	70
	1400 - 2300	1 hour	65
Sundays & Public Holiday	0700 – 2300	1 hour	65
Any night	2300 – 0700	1 hour	55

Note: (1) Duration of exceedance must occur for 10 or more days or nights in any 15 consecutive days or nights; or a total number of days exceeding 40 days or nights in any 6 consecutive months.

1.3.70 Table 1.21 sets out the LOAEL and SOAEL values adopted for construction vibration and the derivation of these values are detailed in Annex 6G.1.

Table 1.21: Table 1.21: LOAEL and SOAEL values for construction vibration (all construction sources) for human receptors

LOAEL	SOAEL	Parameter
0.3	10.0	PPV mm/s

1.3.71 **Table 1.22** sets out the LOAEL and SOAEL values adopted for noise from the operational power station and other mechanical services and the derivation of these values are detailed in **Annex 6G.1**.

Table 1.22: LOAEL and SOAEL values for noise from the operational power station and other mechanical services (all values are free field values)

Period	Sensitivity of receptor	LOAEL	SOAEL
Day	Medium	BG+0dB, L _{Ar} , dB	BG+10, L _{Ar} or Above 60dB, L _{Aeq, 16h} , whichever is the higher
	Low		65dB, L _{Aeq, 16h}
Night	Medium	BG+0dB, L _{Ar} , dB or 40dB L _{Night} , whichever is the higher ¹	BG+10, L _{Ar} or Above 55dB, L _{Night} , dB, whichever is the higher
	Low (if occupied at night)		65dB, L _{Aeq, 8h}

Note: ¹ – The 40dB L_{Night} threshold is stated as a lower cut-off for the LOAEL at night as there is unlikely to be an adverse effect below this level. This is part of the contextual consideration required by BS 4142, embedded in the definition of the night-time LOAEL.

1.3.72 **Table 1.23** sets out the LOAEL and SOAEL values adopted for noise from general activities, as described previously, which will include activities in car parks, security areas (other than those at the main development site), campus activities, freight management facilities, operational level crossings and off-site sports facilities. The derivation of these values are detailed in Annex 6G.1.

Table 1.23: LOAEL and SOAEL values for general activity noise (excludes main development site) (all values are free-field)

Time Period	LOAEL	SOAEL
Day (07:00-23:00)	50dB L _{Aeq, 16h} , (free field)	60dB L _{Aeq, 16h} , (free field)
Night (23:00-07:00)	40dB L _{Night, outside} (free-field)	55dB L _{Aeq, 8h} , (free field)
	60dB, L _{Amax} , (free field)	70dB, L _{Amax} , (free field)

1.3.73 **Table 1.24** sets out the LOAEL and SOAEL values for road traffic noise across the Sizewell C Project. The values are taken from LA111, which does not state whether the values should apply to existing roads as well as new or amended roads.

1.3.74 Adopting a precautionary approach, it is considered that the SOAELs and LOAELs could be applied, but it should be recognised that development-generated traffic would need to be a substantial cause of any exceedances, and that exceedances that pre-date the project are not considered to result from the project. To test whether the proposed development is a substantial cause of the exceedance, or to measure whether the proposed development is the cause of an existing exceedance becoming greater, a change in traffic noise of at least +1dB must occur as a result of the development-generated traffic.

Table 1.24: LOAEL and SOAEL values for road traffic noise

Time Period	LOAEL	SOAEL
Day (06:00-24:00)	55dB L _{A10,18hr} facade	68dB L _{A10,18hr} façade
Night (00:00-06:00)	40dB L _{night} , outside (free-field)	55dB L _{night} , outside (free-field)

1.3.75 **Table 1.25** sets out the LOAEL and SOAEL values adopted for rail noise and the derivation of these values are detailed in **Annex 6G.1**.

Table 1.25: LOAEL and SOAEL values for rail noise

Time Period	LOAEL	SOAEL
Day (07:00-23:00)	50dB L _{Aeq, 16h} , (free field)	66dB L _{Aeq, 16h} , (free field)
Night (23:00-07:00)	40dB L _{night} , outside (free-field)	59dB L _{Aeq, 8h} , (free field)
	60dB, L _{Amax} , (free field)	77dB, L _{Amax} , (free field)

1.3.76 The LOAEL and SOAEL values for railway vibration are set out in **Table 1.26** and the derivation of these values is detailed in **Annex 6G.1**.

Table 1.26: LOAEL and SOAEL values (internal) for groundborne vibration from rail movements on the green rail route, Saxmundham to Leiston branch line and East Suffolk Line at night

Receptor sensitivity	Period	LOAEL	SOAEL	Parameter
High	Would require site specific criteria.			VDV, m/s ^{1.75}
Medium	Day (07:00 to 23:00 hours).	0.2	0.8	
	Night (23:00 to 07:00 hours).	0.1	0.4	
Low	Day (07:00 to 23:00 hours).	0.4	1.6	
Very low	Day (07:00 to 23:00 hours).	0.8	3.2	

1.3.77 The criteria set out in **Table 1.26** apply at the point of entry into the human body, i.e. within the affected properties.

1.3.78 The LOAEL and SOAEL values for groundborne noise from the railway are set out in **Table 1.27** and the derivation of these values are detailed in **Annex 6G.1**. Receptors with high sensitivity would need a bespoke assessment, taking account of specific sensitivities and local circumstances.

Table 1.27: LOAEL and SOAEL values (internal) for groundborne noise from rail movements on the green rail route, Saxmundham to Leiston branch line and East Suffolk Line at night

Receptor sensitivity	Period	LOAEL	SOAEL	Parameter
Medium	At any time during occupation / use	35	50	L _{ASmax} , dB
Low		35	50	

f) Assessment methodology

i. Establishing the baseline

Existing baseline

- 1.3.79 The existing baseline has been established by field surveys carried out between 2013 and 2019 which comprised a mix of unmanned and manned measurements over both short- and long-term periods. Survey locations were discussed and agreed with local authorities.
- 1.3.80 A representative subset of sites that were surveyed prior to 2015 were re-surveyed in between 22 May 2019 and 10 July 2019 to confirm that there had been no change in levels to validate the baseline monitoring results.
- 1.3.81 Locations selected for additional surveys in 2019 were principally those where preliminary noise assessments had identified a potential change in sound levels from the proposed development (either construction or operational phases). Further detail on the baseline monitoring is provided in **Volume 2, Appendix 11A**.
- 1.3.82 Baseline road traffic noise conditions have also been determined through modelling, based on flow data, speed, road surface and percentage of vehicles over 3.5 tonnes, using the calculation method set out in CRTN.

Future baseline

- 1.3.83 No changes to the baseline noise environment are anticipated for any noise or vibration source with the exception of road traffic. Future baseline noise levels have been predicted based on flows for 2023, 2028 and 2034, which are representative years for the early construction traffic peak, the main construction traffic peak and once construction of Sizewell C is complete.
- 1.3.84 Potential future noise sensitive receptors have been identified through examination of committed developments identified as part of the cumulative impact assessment, as detailed in **Volume 10, Chapter 1** of this **ES**.

ii. Assessment of Construction

Construction noise

Main development site

- 1.3.85 Construction noise from the main development site has been predicted, based on available information on construction methodology, phasing, source data for each different source type, likely equipment on times and topography, which changes in some areas over time due to, for example, stockpiling. A detailed description of the modelling prediction process for the main development site is set out in **Volume 2, Appendix 11B**.

iii. Associated developments

- 1.3.86 Construction noise from new road schemes and from the construction of the rail extension route and the upgrade to the Saxmundham to Leiston branch line has also been predicted by 3D modelling (using SoundPLAN).
- 1.3.87 Construction noise from the other associated development sites has been predicted based on calculations in accordance with the methodology from BS5228-1, modified to take account of the influence of air absorption and meteorological effects, where appropriate. These modifications result in a small increase in predicted values at distances below approximately 750 metres. BS5228-1 acknowledges at F.2.2.2.2 that at longer propagation distances meteorological effects may need to be considered, stating:

“At distances over 300m noise predictions have to be treated with caution, especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects.”

- 1.3.88 The modifications are considered to comply with the assessment method.

Construction vibration

- 1.3.89 The level of vibration from construction has been predicted by obtaining source data and calculating the decay of vibration energy with distance. Appropriate account has been taken of typical ground attenuation mechanisms at the surface of the ground, and the expectation for energy transfer from the ground into the foundations of a building. The vibration amplitude in the building foundation has then been used to estimate the response of people to that vibration.

iv. Operational noise and vibration

Sizewell C nuclear power station

- 1.3.90 SoundPLAN version 8.0 noise modelling software package has been used to predict the existing sound levels over the study area from the proposed operational phase of the Sizewell C power station. SoundPLAN calculates $L_{Aeq,T}$ levels at defined receptors in accordance with the appropriate standards. The calculation is based on a number of input parameters, including; source sound level data, barriers (both natural and buildings), receptor positions, topography and intervening ground conditions. **Volume 2, Chapter 11, Appendix 11C** contains details of the assessment.

Associated developments

- 1.3.91 Operational noise from rail and new road schemes has been carried out by 3D noise modelling, with noise propagation due to distance, air absorption, ground absorption, local topography, and any screening considered as appropriate. Further detail is provided in **Chapter 4** of **Volumes 5, 6, 7** and **9**.
- 1.3.92 Operational noise from other associated development sites has been predicted by calculation. Potentially significant noise sources have been identified, noise source levels obtained and noise levels at nearby noise sensitive receptors predicted, taking account of noise propagation due to distance, air absorption, ground absorption local topography and any screening, as appropriate.
- 1.3.93 The level of vibration from the movement of freight traffic has been predicted by obtaining source data and calculating the decay of vibration energy with distance. Appropriate account has been taken of typical ground attenuation mechanisms at the surface of the ground, and the expectation for energy transfer from the ground into the foundations of a building. The vibration amplitude in the building foundation has then been used to estimate the response of people to that vibration and to estimate the level of structure borne (re-radiated) sound within the building.
- 1.3.94 The assessment of groundborne noise uses the same approach as described for railway vibration, with the additional step of taking account of the radiation of sound as a result of the vibration.
- 1.3.95 Full details of the methods for calculating railway vibration and groundborne noise are set out in **Annex 6G.2**.

v. Road traffic noise – existing roads

- 1.3.96 Changes to noise levels resulting from changes to road traffic flows during the construction period during both early years and peak construction have been predicted by examining road links where a potential adverse effect may occur and then calculating the difference in level (using the method described in CRTN) expressed as a 18 hour L_{A10} value for daytime and as an L_{night} value for night time. Further detail is provided in **Volume 2 Chapter 11**. Results are reported for new roads schemes showing the predicted magnitude of the change in level and the resultant absolute level for roads affected. Further detail is provided in **Volumes 5, 6 and 7 Chapter 4**.

g) Assumptions and limitations

- 1.3.97 This section summarised the assumptions and limitations that generally apply to all, or a number of the noise and vibration assessments for the proposed developments. These include:

i. Assumptions

- When assessing vibration propagation, ground conditions have been assumed that will lead to reasonable worst-case outcomes, i.e. conditions that propagate vibration to a greater degree than might be considered ‘average’.

ii. Limitations

- The complexity of the modelling methodology and limited detail on the construction methods at this stage in the project, means that some construction mitigation measures proposed are generalised and would be subject to refinement as part of the detailed design. For example, recommended mitigation includes installation of physical barriers or other screening at the main development site and associated development sites. Results are shown with and without screening to demonstrate what is achievable.
- Where appropriate, good practice recommendations are made for specific plant and processes (in accordance with BS 5228-1) with the aim of further reducing noise, either at source or by other means.

- 1.3.98 Further details on assumptions and limitations as relevant to the site-specific noise and vibration assessments are detailed in the relevant assessment chapter.

References

- 1.1 Part III of the Control of Pollution Act 1974
- 1.2 Environmental Protection Act 1990
- 1.3 The Environmental Permitting Regulations 2016
- 1.4 The Noise Insulation Regulations 1975 (as amended 1988)
- 1.5 The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996
- 1.6 Overarching National Policy Statement (NPS) for Energy (NPS EN-1)
- 1.7 National Policy Statement (NPS) for Nuclear Power Generation (NPS EN-6)
- 1.8 MHCLG (2019) National Planning Policy Framework
<https://www.gov.uk/government/publications/national-planning-policy-framework--2> [Accessed July 2019]
- 1.9 NPSE (2010) Noise Policy Statement for England
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed Jan 2020]
- 1.10 DEFRA (2018) Government's 25 Year Environment Plan.
<https://www.gov.uk/government/publications/25-year-environment-plan> [Accessed July 2019]
- 1.11 ESC (2019) Suffolk Coastal District Council Final Draft Local Plan
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- 1.12 ESC (2013) Suffolk Coastal District Council Core Strategy and Development Management Policies
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- 1.13 The emerging Suffolk Coastal Final Draft Local Plan
- 1.14 MHCLG (2019) Planning Practice Guidance
<https://www.gov.uk/government/collections/planning-practice-guidance> [Accessed July 2019]
- 1.15 World Health Organisation Guidelines for Community Noise 1999
- 1.16 World Health Organisation Regional Office for Europe Environmental Noise Guidelines for the European Region 2018

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- 1.17 World Health Organisation 'Night noise guidelines for Europe' 2009
- 1.18 Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration
<http://www.standardsforhighways.co.uk/ha/standards/dmr/b/vol11/section3/LA%20111%20Noise%20and%20vibration-web.pdf> [Accessed Jan 2020]
- 1.19 British Standard BS8233: 2014 – Guidance on sound insulation and noise reduction for buildings, BSI Standards Publication 2014.
- 1.20 British Standard BS5228-1 Noise: 2009+A1: 2014 – Code of Practice for noise and vibration control at open construction sites – Noise
- 1.21 British Standard BS5228-2 Vibration: 2009+A1: 2014 – Code of Practice for noise and vibration control at open construction sites – Vibration.
- 1.22 British Standard BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting' 2008
- 1.23 Calculation of Railway Noise (CRN). Department of Transport 1995.
- 1.24 Calculation of Road Traffic Noise (CRTN), Department of Transport, Welsh Office (1988)
- 1.25 British Standard BS4142: 2014+A1: 2019 – Methods for rating and assessing industrial and commercial sound
- 1.26 Institute of Environmental Management and Assessment (IEMA) Guidelines for environmental noise impact 2014
- 1.27 Association of Noise Consultants (ANC) Measurement and assessment of groundborne noise and vibration. 2011
- 1.28 BS 7385-2: 1993 - Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundborne vibration



VOLUME 1, CHAPTER 6, APPENDIX 6G, ANNEX 6G.1: NOISE AND
VIBRATION POLICY, GUIDANCE, STANDARD, ASSESSMENT
METHODOLOGY AND CRITERIA LEGISLATION AND METHODOLOGY

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Report

Sizewell C Project

Volume 1, Appendix 6G,
Annex 6G.1

Noise and Vibration Policy,
Guidance, Standards,
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1.0 Introduction

- 1.1 Noise and vibration arising from the construction and operation of Sizewell C nuclear power station, and associated developments has the potential to impact on sensitive receptors. This document describes relevant overarching national and local policies applicable to noise and vibration generated by a Nationally Significant Infrastructure Project (NSIP).
- 1.2 Neither governmental nor local planning policy provide defined methodology and/or criteria for assessing noise and vibration generated by proposed development, including NSIPs, and it is necessary to refer to relevant technical standards and other sources of guidance to identify appropriate and topic-specific assessment methodologies and/or criteria for:
- noise and vibration generated by construction and/or restoration activities;
 - noise and vibration generated by associated rail freight and road traffic;
 - noise from car parks, security areas (other than those at the main development site), park and ride operations, and campus activities;
 - noise generated by mechanical services during the construction of Sizewell C on the main development site and associated development sites; and
 - noise generated by the operation of the Sizewell C nuclear power station.
- 1.3 The construction and the operation of the Sizewell C Project also has the potential to impact on the existing quiet character of the area and affect tranquillity and this is considered within the Amenity and Recreation assessment chapters, as relevant. A detailed consideration of sound and sound character has been carried out to inform that assessment. This document also describes the methodology adopted to assess the potential impact of the level and character of predicted sound on tranquillity.

2.0 National Policy

- 2.1 The Planning Act (2008) was introduced in part to streamline the decision-making process for NSIPs, involving the submission of an application for development consent to the Planning Inspectorate. If the proposals are accepted by the Planning Inspectorate, on behalf of the Secretary of State, then a Development Consent Order (DCO) is subsequently granted.
- 2.2 National Policy Statements (NPS) set out government policy for different types of NSIP and the guidance contained in NPS EN-1 '*Overarching National Policy Statement for Energy*' and NPS EN-6 '*National Policy Statement for Nuclear Power Generation*' is relevant when determining the requirements and appropriate methodology for assessing noise and vibration generated by a proposed nuclear power station development. NPS EN-1 and NPS EN-6 are described below.

NPS EN-1

- 2.3 The context for the NPS EN-1 '*Overarching National Policy Statement for Energy*' (2011) guidance on noise and vibration is provided in paragraph 5.11.1, which states:

“Excessive noise can have wide-ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. The Government’s policy on noise is set out in the Noise Policy Statement for England.”

- 2.4 Paragraph 5.11.1 goes on to note that vibration should be considered on an equal basis to noise:

“Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to “noise” below apply equally to assessment of impacts of vibration.”

- 2.5 NPS EN-1 sets out the following factors that it states will determine the potential noise and vibration impact of a proposed energy infrastructure development:

1. inherent operational noise from the proposed development, and its characteristics;
2. the proximity of the proposed development site to noise-sensitive premises and areas (including dwellings, schools and hospitals), and noise sensitive areas (including certain parks and open spaces);
3. the proximity of the proposed development site to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and
4. the proximity of the proposed development site to designated sites where noise may have an adverse impact on protected species or other wildlife.

- 2.6 NPS EN-1 states that proposed energy infrastructure development should not be permitted unless it is demonstrated that the proposals will meet the following aims:
- avoid significant adverse impacts on health and quality of life from noise;
 - mitigate and minimise other adverse noise impacts on health and quality of life from noise; and
 - where possible, contribute to improvements to health and quality of life through the effective management and control of noise.
- 2.7 These aims are similar to the aims set out in the 2010 '*Noise Policy Statement for England*' (NPSE), which is discussed later in this section.
- 2.8 To demonstrate that the aims of NPS EN-1 will be achieved, the assessment method and scope should be proportionate to the likely impact, and paragraph 5.11.4 of NPS EN-1 sets out a number of elements that should be considered:
- a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;
 - identification of noise sensitive premises and noise sensitive areas that may be affected;
 - the characteristics of the existing noise environment;
 - a prediction of how the noise environment will change with the proposed development;
 - in the shorter term such as during the construction period;
 - in the longer term during the operating life of the infrastructure;
 - at particular times of the day, evening and night as appropriate;
 - an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and
 - measures to be employed in mitigating noise.
- 2.9 In practice, this means that different sources of potential noise and vibration impact should be assessed in accordance with standards and/or guidance relevant to that specific impact. Specifically, NPS EN-1 states that prediction, assessment and management of construction noise which could impact noise-sensitive human receptors should be undertaken with reference to BS 5228, the current version of which is contained in Parts 1 and 2 of BS 5228: 2009+A1: 2014 '*Code of practice for noise and vibration control on construction and open sites*'; Part 1 covers noise, and Part 2 covers vibration.

- 2.10 For operational noise and vibration, NPS EN-1 refers to the following documents, which are examples of relevant British Standards:
- BS 4142, the current version of which is BS 4142: 2014+A1: 2019 *'Methods for rating and assessing industrial and commercial sound'*
 - BS 6472, the current version of which is BS 6472-1: 2008 *'Guide to evaluation of human exposure to vibration in buildings. Part 1 Vibration sources other than blasting'*
 - BS 8233, the current version of which is BS 8233: 2014 *'Guidance on sound insulation and noise reduction for buildings'*
- 2.11 The reference documents are not limited to these examples, and NPS EN-1 allows for reference to other guidance documents.
- 2.12 NPS EN-1 states at paragraph 5.11.5 that the noise and vibration impact of ancillary activities associated with the development, such as that generated by road traffic, rail freight or other forms of transportation, should also be considered, although no specific standards are recommended.
- 2.13 Paragraph 5.11.12 of NPS EN-1 sets out three options for mitigating the adverse effects of noise and/or vibration, which include; engineering solutions; lay-out options; and administrative controls. In certain situations, NPS EN-1 allows for the provision of sound insulation, stating at paragraph 5.11.13:
- "In certain situations, and only when all other forms of noise mitigation have been exhausted, it may be appropriate for the IPC to consider requiring noise mitigation through improved sound insulation to dwellings."*
- 2.14 Paragraph 5.11.7 of NPS EN-1 requires the applicant to consider the potential impacts on protected species or other wildlife, and to consult with the Environment Agency and Natural England. Appropriate assessment methods and criteria for the assessment of noise impacts on protected species and wildlife are found in the Ecology assessment.

NPS EN-6

- 2.15 NPS EN-6 *'National Policy Statement for Nuclear Power Generation'* (2011) sets out governmental policy specifically relating to DCO applications for nuclear power generation. It should be read in conjunction with NPS EN-1, which addresses the assessment and general handling of impacts that are not specific to particular technologies.
- 2.16 NPS EN-6 does not require any additional guidance or standards to be considered, but in relation to noise from nuclear power stations states that:
- "The operation of a new nuclear power station is unlikely to be associated with significant noise, vibration... impacts (although there may be local impacts from transport and associated activities during construction...). With appropriate mitigation, the subsequent effect of these potential impacts on human health is unlikely to be significant."*

- 2.17 The DCO Examining Authority should, in accordance with NPS EN-6, “*consider the positive effect of employment and other socioeconomic impacts ... on human health and well-being*”. While not directly relevant to the noise and vibration impact assessment methodology, this suggests that the significance of any adverse effects, whether from noise and vibration or otherwise, should be balanced against any socioeconomic and/or other beneficial effects.

Other Policy Documents

- 2.18 In addition to the NPS documents, if there are other considerations that are both relevant and important to the determination of an application for a DCO, such matters can also be considered alongside the NPS, and other guidance may be relevant

National Planning Policy Framework (NPPF)

- 2.19 The National Planning Policy Framework (NPPF) contains planning guidance for development in England, but does not contain any policies relevant to nationally significant infrastructure projects, as these are determined in accordance with the decision-making framework in the Planning Act (2008) and NPS EN-1 and NPS EN-6.

Noise Policy Statement for England (NPSE)

- 2.20 The 2010 DEFRA publication ‘*Noise Policy Statement for England*’ (NPSE) sets out policy advice applicable to the assessment and management of noise, including environmental noise. The NPSE states three policy aims, which are broadly the same as those set out in NPS EN-1. The three aims are:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

- 2.21 All three of these aims are to be considered in the context of Government policy on sustainable development.

- 2.22 The first two aims require that no significant adverse impact should occur and, where noise falls between a level representing the lowest observable adverse effect (LOAEL) and a level representing a significant observed adverse effect (SOAEL), then according to the NPSE:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

- 2.23 The NPSE notes that, “It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times”.

- 2.24 The NPSE describes the Government's "guiding principles of sustainable development", listing the following as underpinning their sustainable development strategy:
- ensuring a strong, healthy and just society;
 - using sound science responsibly;
 - living within environmental limits;
 - achieving a sustainable economy; and
 - promoting good governance.
- 2.25 Thus, noise should not be considered in isolation; the economic and social benefit of a proposed development should be considered alongside the potential adverse effects from noise.

PPG

- 2.26 The Government first published their Planning Practice Guidance on noise (PPG) in March 2014, with the most recent version issued in July 2019. The PPG provides guidance on the interpretation and implementation of planning policy, as contained in the NPPF, and NPSE, and in this instance, the various NPSs.
- 2.27 The use of the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) for the assessment of noise impacts is reinforced in the PPG, which seeks to define human perception at these effect levels.
- 2.28 The PPG describes the LOAEL as the level at which *"noise can be heard and causes small changes in behaviour, attitude or other physiological response"* and it is *"present and intrusive"*. Below this level, the PPG describes the NOAEL, or No Observed Adverse Effect Level, which it notes *"can be heard but does not cause any change in behaviour, attitude or other physiological response"* as the noise is *"present but not intrusive"*. The NOAEL is not included in the NPSE or NPSs, and is therefore introduced in the PPG. Below the NOAEL, the PPG describes the NOEL, or No Observed Effect Level, where noise is *"not present"* and has *"no effect"*.
- 2.29 The PPG describes the LOAEL as the:
- "... boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise)."*

2.30 Significant observable adverse effects, i.e. those occurring at or above the SOAEL, are described as *“present and disruptive”* and states that above the SOAEL:

“... the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.”

2.31 The PPG introduces the concept of an Unacceptable Adverse Effect Level, or UAEL, which again is not included in the NPSE or NPSs. This is a threshold further above the SOAEL, where the noise is *“present and very disruptive”* and causes *“extensive and regular changes in behaviour, attitude or other physiological response”*.

2.32 This hierarchy of effects includes the following actions:

- NOEL: No specific measures required;
- NOAEL: No specific measures required;
- LOAEL: Mitigation and reduce to a minimum;
- SOAEL: Avoid; and
- UAEL: Prevent.

2.33 In relation to options for mitigation, paragraph 010 of the PPG advises that:

“In general, for developments that are likely to generate noise, there are 4 broad types of mitigation:

- engineering: reducing the noise generated at source and/or containing the noise generated;
- layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;
- using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;
- mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.”

- 2.34 In relation to the factors that are relevant when seeking to identify areas of tranquillity, paragraph 008 of the PPG states;

“For an area to justify being protected for its tranquillity, it is likely to be relatively undisturbed by noise from human sources that undermine the intrinsic character of the area. It may, for example, provide a sense of peace and quiet or a positive soundscape where natural sounds such as birdsong or flowing water are more prominent than background noise, e.g. from transport.

Consideration may be given to how existing areas of tranquillity could be further enhanced through specific improvements in soundscape, landscape design (e.g. through the provision of green infrastructure) and/or access.”

- 2.35 When considering potential effects of noise on tranquillity, it is therefore important to consider the relative levels of man-made and natural sounds, the overall level of sound and the contribution of transportation noise sources to the overall noise level.

3.0 Local Policy

- 3.1 Suffolk County Council currently has no policies relevant to control noise from the proposed development.
- 3.2 East Suffolk Council's '*Core Strategy*' and '*Development Management Policies*' do not currently provide any form of detailed noise policy, although Development Management Policy DM23 '*Residential Amenity*' does state that the council will take into account potential "*noise and disturbance*" when considering the impact of proposed development on residential amenity.
- 3.3 In addition, the emerging Suffolk Coastal Final Draft Local Plan contains Policy SCLP4.3 which relates to the expansion and intensification of employment sites, which is relevant in this instance, stating that such proposals will be permitted unless:

"The proposed use is not compatible with the surrounding employment uses in terms of car parking, access, noise, odour and other amenity concerns; or

There is harm to the amenity and living conditions of local residents and businesses relating to matters of noise, vibration, dust and light".

4.0 Relevant Standards and Guidance

- 4.1 Suffolk County Council currently has no policies relevant to control noise from the proposed development.

Sensitivities

- 4.2 Sensitivities referred to within this document are defined in Table 1 below.

Table 1: Definitions of sensitivity for noise effects on human receptors

Value / sensitivity	Description
High	Receptors that are highly sensitive to noise or vibration such as theatres, auditoria, recording studios, concert halls and highly vibration sensitive structures or uses such as certain laboratories medical facilities or industrial processes.
Medium	Noise and vibration sensitive receptors such permanent residential buildings, hospitals and other buildings in health/community use, buildings in educational use, hotels and hostels.
Low	Receptors with limited sensitivity to noise and vibration such as offices, libraries buildings in religious use, and other workplaces with a degree of sensitivity due to the need to concentrate.
Very Low	Receptors of very low sensitivity to noise and vibration such as industrial or commercial buildings and transient or mobile receptors.

- 4.3 Where noise has the potential to affect other receptors, particular sensitivities have been addressed within the relevant topic chapter of this Environmental Statement, as follows:

- Terrestrial ecological and ornithological receptors (e.g. bat and bird species): **Volume 2 Chapter 14** and **Volumes 3 to 9 Chapter 7**.
- Amenity and recreation receptor (e.g. users of recreational resources): **Volume 2 Chapter 15** and **Volumes 3 to 9 Chapter 8**.
- Historic environment receptors (e.g. built heritage): **Volume 2 Chapter 16** and **Volumes 3 to 9 Chapter 9**.
- Marine ecological receptors (e.g. marine mammals): **Volume 2 Chapter 22**.

British Standard 5228, Parts 1 and 2

- 4.4 NPS EN-1 stipulates that the prediction and assessment of airborne construction noise with the potential to impact noise-sensitive human receptors should be undertaken with reference to BS 5228. The current version of the standard relating to noise is BS 5228: 2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Part 1 Noise*' (Part 1 of BS 5228).
- 4.5 Part 1 of BS 5228 sets out a method for predicting, assessing and controlling noise arising from a wide variety of construction and related activities, and sets out tables of sound

power levels generated by a wide variety of construction plant to facilitate such predictions.

- 4.6 Noise levels generated by a construction site will depend upon a number of variables, the most significant of which are:
- the amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
 - the periods of operation of the plant at the development site, known as the “on-time”;
 - the distance between the noise source and the receptor, known as the “stand-off”;
 - the attenuation due to ground absorption or barrier screening effects; and
 - the reflection of noise due to the presence of hard vertical faces such as walls.
- 4.7 The prediction method set out in Part 1 of BS 5228 takes account of each of these variables, and provides typical source emission levels for a range of construction plant undertaking specific construction activities.
- 4.8 Part 1 of BS 5228 sets out methods for predicting and assessing noise from construction and open sites, and recommends basic methods to control construction noise. Annex E of Part 1 of BS 5228 provides guidance on appropriate thresholds at which residential properties should be insulated or people temporarily rehoused.
- 4.9 Annex E of Part 1 of BS 5228 provides example methods of assessment for use when assessing noise from construction and open sites. Example method 1, the ‘ABC method’, proposes thresholds for potential significant effects at dwellings based on the prevailing ambient sound levels. This requires knowledge of the prevailing ambient sound levels at each dwelling and analysis of each dwelling, or group of dwellings, to establish which threshold category should apply.
- 4.10 Example method 2 is broadly similar, in that it identifies potentially significant construction noise impacts if the pre-construction ambient sound level is exceeded by 5dB or more, and is therefore also based on knowledge of the ambient sound climate.
- 4.11 Annex E.5 of Part 1 of BS 5228 states that where construction activities involve large scale and long-term earth moving activities, such as during the early years of construction of Sizewell C, then this is more akin to surface mineral extraction than conventional construction activity and the advice formerly provided in the Technical Guidance to the NPPF should be considered.
- 4.12 The Technical Guidance to the NPPF is no longer current, Paragraph: 021 Reference ID: 27-021-20140306 of the PPG, which supersedes it, states that it states that a noise limit should be applied which does not exceed the background level by more than 10dB, where this is possible while still meeting the specific requirements of the work. In addition to this, daytime (07:00 to 19:00 hours) threshold limits should be no higher than 55dB $L_{Aeq,1h}$ and night-time (22:00 to 07:00 hours) thresholds should be no higher than 42dB, $L_{Aeq,1h}$.
- 4.13 Guidance on the measurement, prediction, assessment and control of ground-borne vibration generated from construction and open sites is contained in Part 2 of BS 5228: 2009+A1: 2014 ‘*Code of practice for noise and vibration control on construction and open sites. Part 2 Vibration*’.

- 4.14 Part 2 of BS 5228 relates to vibration, which may be impulsive, such as that due to hammer-driven piling; transient, such as that due to vehicle movements along a railway; or continuous, such as that due to vibratory driven piling. The primary cause of community concern generally relates to building damage from both construction and operational sources of vibration, although the human body can perceive vibration at levels that are substantially lower than those required to cause building damage.
- 4.15 Part 2 of BS 5228 indicates that vibration might be just perceptible at 0.14 mm/s peak particle velocity (or ppv) in the most sensitive situations for most vibration frequencies associated with construction. The standard goes on to note that at 0.3 mm/s vibration might be just perceptible in residential environments, at 1.0 mm/s vibration in residential environments is likely to cause complaint although it can be tolerated if prior warning and explanation have been given to the residents and at 10 mm/s vibration is likely to be intolerable for any more than a very brief exposure.
- 4.16 Damage to buildings associated solely with ground-borne vibration is not common and although vibration may be noticeable, there is little evidence to suggest that it produces cosmetic damage such as a crack in plaster unless the magnitude of the vibration is excessively high. The most likely impact, where elevated levels of vibration do occur during the construction works, is associated with human perception.
- 4.17 For cosmetic damage to residential properties in good condition, i.e. without any specific structural weaknesses, Part 2 of BS 5228 repeats the guidance contained in BS 7385: Part 2: 1993 *Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration*. It indicates that cosmetic damage may occur at peak particle velocities of 15mm/s and above.

Transport Research Laboratory (TRL) Reports

- 4.18 The 1986 Transport Research Laboratory (TRL), as it was known as at the time, produced a report in 1986 titled '*Ground vibration caused by civil engineering works*' (TRL Report 53). The report set out the findings of TRL's research into predicting and assessing ground vibration from civil engineering works.
- 4.19 This was followed, in 2000 by Research Report TRL 429: '*Groundborne vibration caused by mechanical construction works*'.
- 4.20 These reports provide information about thresholds of sensitivity for human receptors, calculation methods for deriving attenuation with distance for ground-borne vibration and source levels for a range of common sources of vibrational energy used for construction work.

British Standard BS 4142: 2014 + A1:2019

- 4.21 British Standard (BS) 4142: 2014+A1: 2019 '*Methods for rating and assessing industrial and commercial sound*' (BS 4142) describes a method for rating and assessing sound of an industrial or commercial nature, which includes:
- sound from industrial and manufacturing processes;
 - sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 4.22 The industrial or commercial sound is assessed outside an existing or proposed dwelling or premises used for residential purposes. BS 4142 does not consider internal spaces in terms of its numerical assessment.
- 4.23 The procedure contained in BS 4142 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime or a 15 minute period for the night-time. Daytime and night-time are not defined in BS 4142, but the standard notes that they are typically taken to be 07:00 to 23:00 hours for daytime, and 23:00 to 07:00 hours for night-time.
- 4.24 BS 4142 sets out a number of methods of determining the specific sound level, including, for situations where the specific sound source does not yet exist, the ability to determine it through calculation alone, stating at Section 7.3.6:
- "Determine the specific sound level by calculation alone if measurement is not practicable, for example if the source is not yet in operation. In such cases, report the method of calculation in detail and give the reason for using it."
- 4.25 The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal, impulsive or intermittent elements. The standard sets out subjective and objective methods for determining the presence of tones or impulsive elements, but notes that the objective methods should be used where the subjective method is not sufficient. For situations where the specific sound source does not yet exist, the objective methods cannot be used.
- 4.26 The penalty for tonal elements is between 0dB and 6dB, and the standard notes:
- "Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible."
- 4.27 The penalty for impulsive elements is between 0dB and 9dB, and the standard notes:
- "Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible."

- 4.28 BS 4142 also states that if a source has identifiable on/off conditions, a penalty may be applied for intermittency. The penalty for sources that have intermittent elements is stated as:

“If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.”

- 4.29 Where the specific sound features acoustic characteristics that are distinctive against the residual acoustic climate, but are not tonal, impulsive, or intermittent in nature, a penalty of +3dB can be applied.

- 4.30 The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15 minute intervals. The standard states that:

“A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.”

- 4.31 The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- “a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

- 4.32 The standard goes on to note that:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

- 4.33 BS 4142 places much emphasis on the context of the assessment, stating this can be used to provide additional, relevant information that may be excluded from a simple comparison between the commercial or industrial sound and the background sound. So while the standard does not allow the direct assessment of sound inside a property, it can be appropriate to consider the internal sound levels with reference to other standards if, for example, affected receptors include façade insulation and/or ventilation. This is set out in Section 11 of the standard, under the heading “Assessment of Impacts”:

“Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - i) facade insulation treatment;
 - ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 - iii) acoustic screening.”

4.34 It is clear that BS 4142 does allow the internal environment to be considered as part of the contextual part of the assessment.

4.35 BS 4142 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

BS 8233: 2014

4.36 The scope of British Standard (BS) 8233: 2014 ‘*Guidance on sound insulation and noise reduction for buildings*’ (BS 8233) is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

4.37 BS 8233 sets out internal criteria for residential properties, as shown in Table 2.

Table 2: BS 8233 recommended internal noise levels, dB

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB L _{Aeq,16h}	-
Dining	Dining room/area	40dB L _{Aeq,16h}	-
Sleeping (daytime resting)	Bedroom	35dB L _{Aeq,16h}	30dB L _{Aeq,8h}

4.38 BS 8233 contains the following relevant guidance in footnotes to the above information:

“Note 4: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{Amax,F}, depending on the character and number of events per night. Sporadic noise events could require separate values.

Note 5: If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

Note 7: Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved."

4.39 Although Note 4 above refers to setting a guideline value for maximum noise levels, BS 8233: 2014 does not provide any guidance on a suitable criterion. Note 7 above effectively sets 'reasonable' criteria 5dB above the values in Table 2.

4.40 Section 7.7.3.2 of BS 8233, titled Design criteria for external noise states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments."

4.41 BS 8233 goes on to note that the upper guideline value may be exceeded in certain circumstances:

"However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

4.42 Achieving the lowest practicable noise levels in gardens is deemed acceptable in BS 8233 in circumstances where development is needed in areas where the upper 55dB limit cannot be achieved.

4.43 Although BS 8233 refers to the use of BS 4142 for the assessment of industrial noise, it stands as the only British Standard or guideline on acceptable levels of noise in a residential environment.

4.44 All of the guideline values in BS 8233 are valid for steady sources of sound with no distinctive acoustic characteristics. The standard notes in Section 7.7.1 that:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

4.45 However, the standard does not define what those lower limits should be.

World Health Organisation Guidance

- 4.46 Recent guidance on internal and external noise levels from community noise sources and transportation noise sources was published by the World Health Organisation (WHO) in 1999, in *'Guidelines for Community Noise'*; in 2009 in *'Night Time Noise Guideline for Europe'* and then in 2018 in *'Environmental Noise Guidelines for the European Region'*. The 2018 Guidance supersedes earlier guidance although the 2018 guidance specifies that earlier guidance remains valid for values not covered in the 2018 document.
- 4.47 In comparison to the 1999 guidelines, which defined environment-specific exposure levels, the 2018 guidance is source-specific. It recommends values for outdoor exposure to road traffic, railway, aircraft and wind turbine noise, and indoor as well as outdoor exposure levels for leisure noise and describes health effects using L_{den} and L_{night} parameters. Despite this, the 2018 recognises that other parameters may be needed in certain circumstances, stating:
- “In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ($L_{A,max}$) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”
- 4.48 The 2018 guidance has not been incorporated within any standards and nor is it referred to in policy, so although it provides an information review of evidence and thresholds for likely health effects, it is not suitable for use for predicting noise effects.
- 4.49 Internal noise levels are not recommended within the 2018 WHO Guidelines; however, they do recommend that where internal levels are required, earlier advice from the 1999 WHO *'Guidelines for Community Noise'* may be used, stating:
- “all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid.”
- (CNG here refers to the 1999 Community Noise Guidelines)
- 4.50 The World Health Organisation (WHO) document *'Guidelines for Community Noise'* (1999) is based on research into the effects of noise exposure on health (including sleep) and advise that effects on sleep have been observed on individuals exposed to 45dB L_{AFmax} or less, and that it is important to restrict levels above this threshold as far as possible.
- 4.51 WHO *'Night Noise Guidelines for Europe'* (2009) recommends that an:
- “ $L_{night,outside}$ of 40dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.”

- 4.52 They also recommend an Interim Target at 55dB $L_{Aeq,8hr}$ outside dwellings at night, stating that:

“Above this level, the situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.”

DMRB: LA 111, “Noise and Vibration”

- 4.53 The potential for noise from the construction and use of new roads has been considered against the guidance set out in the Design Manual for Roads and Bridges (DMRB), document LA 111 (2019), which provides, “a framework for assessing and managing the noise and vibration effects associated with construction, improvement, use and maintenance of motorways and all purpose trunk roads.”
- 4.54 According to the companion document, *‘Introduction to the Design Manual for Roads and Bridges’* (GG101), LA111 can also be used for the assessment of other roads, i.e. it is not limited to motorways and all-purpose trunk roads.
- 4.55 The guidance provides advice on study areas, an approach for the assessment of the noise and vibration arising from construction of new roads schemes; the assessment of the impact of additional road traffic noise arising as a result of additional construction vehicles and for the assessment of noise from the new road, once operational. It explains that vibration from operational roads may be scoped out of the assessment.
- 4.56 The assessment method requires that three scenarios are assessed, being:
1. The “Do Minimum Opening Year” (DMOY) noise compared to the “Do Something Opening Year” (DSOY) noise. The results from this may be used to provide a prediction of the “short term” magnitude of change, which enable a prediction of the significance of any adverse noise effect. This initial assessment of significance must then be reviewed, bearing in mind local circumstances, using guidance specified for different sets of circumstances.
 2. The “Do Something Future Year” (DSFY) noise compared to the “Do Minimum Opening Year” (DMOY) noise. The results from this may be used to provide a prediction of the “long term” magnitude of change. This may be relevant in considering local circumstances when reviewing the significance of the short term effect.
 3. The “Do Minimum Future Year” (DMFY) noise compared to the “Do Minimum Opening Year” (DMOY) noise. Again, this may be relevant in considering local circumstances when reviewing the significance of the short term effect.
- 4.57 In addition to the three scenarios, for new roads a prediction should be made of road traffic noise level at each sensitive receptor and these are compared to the LOAELs and SOAELs defined in LA111 for new roads as shown in Table 3 below.

Table 3: LOAEL and SOAEL values recommended in LA 111

Time Period	LOAEL	SOAEL
Day (06:00-24:00)	55dB $L_{A10,18hr}$ facade	68dB $L_{A10,18hr}$ façade
Night (00:00-06:00)	40dB L_{night} , outside (free-field)	55dB L_{night} , outside (free-field)

Note: This table contains an internal inconsistency: the night time period is defined as 00:00-06:00 hours, but the parameter used is L_{night} , which is, by definition, always an 8 hour night time value (where night time is defined as 23:00 to 07:00 hours). For the purposes of this assessment night time is considered to be 23:00 to 07:00 hours to provide a consistent approach.

- 4.58 LA111 advises that the LOAEL and SOAEL values may need to be changed to take account of differing sensitivities to noise. Magnitudes of noise changes should be determined according to impact magnitude tables that equate level differences to magnitudes of effect for both short term and long term changes. These changes should also be considered in relation to local circumstances according to guidance specified for certain local conditions in LA111.

Changes to the acoustic character of the area and setting of receptors

- 4.59 Two of the local circumstances described in LA111 relating to acoustic need to be considered for both proposed new road schemes. These are:
- “If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect.”
 - “If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the noise sensitive receptors. In these cases it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect. Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect.”

ISO9613

- 4.60 Noise propagation from operation of the main development proposed development site have been calculated using the proprietary noise modelling software SoundPlan, which implements the common European methods of noise prediction. In this instance, the noise predictions have been undertaken in general accordance with the noise prediction framework set out in ISO9613-2 ‘Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation’. Where longer distance noise propagation has been calculated without the use of this software, the same standard has been used.

- 4.61 The model takes into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption. The model assumes downwind propagation, i.e. a wind direction that assists the propagation of noise from the source to all receptors. The inherent uncertainty in ISO9613 is stated in the standard as being accurate to $\pm 1\text{dB}$ for distances of up to 100 metres, or $\pm 3\text{dB}$ for distances of between 100 metres and 1km, with an average height of propagation of up to 30 metres.

Calculation of Road Traffic Noise

- 4.62 The majority of calculations to predict levels of road traffic noise have been undertaken using the '*Calculation of Road Traffic Noise*' (CRTN), published in 1988 by the former Department of Transport and The Welsh Office. The exception to this is where noise propagation for the assessment of road traffic has been carried out for the assessment of the potential effect of noise on tranquillity for the Sizewell Link Road and Two Village Bypass schemes. For these, it was found that propagation using ISO 9613 (described below) provided a better match with measured levels. This is to be expected, as ISO 9613 is better suited to longer distance noise propagation, as it enables better definition of factors affecting propagation.
- 4.63 CRTN sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles, type of road surface, site geometry and the presence of noise barriers or acoustically absorbent ground, to predict the $L_{A10,18\text{hrs}}$ or $L_{A10,1\text{hr}}$ noise level for any receptor point at a given distance from the road.
- 4.64 CRTN applies a correction for roads with a flow of less than 4,000 vehicles per 18 hours or less than 200 vehicles per hour; the CRTN calculation method does not cover roads with a flow of less than 1,000 vehicles per 18 hours or flows below 50 vehicles per hour.

Calculation of Railway Noise

- 4.65 Calculations of railway noise have been undertaken using the '*Calculation of Railway Noise*' (CRN), published in 1995 by the Department of Transport.
- 4.66 CRN sets out standard procedures for calculating noise levels from railways, using a number of input variables, including vehicle type, speed, site geometry and the presence of noise barriers or acoustically absorbent ground to predict a Sound Exposure Level (SEL) at the receiver point. The SEL is converted to daytime and night-time values by applying appropriate corrections and accounting for the number of trains within each time period.
- 4.67 In this instance, the calculation algorithms have been used to calculate train noise levels, based on timetabled and anticipated movements.

BS 6472: 2008

- 4.68 British Standard 6472: 2008 *'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting'*, contains a method for assessing the human response to vibration in terms of the vibration dose value. The advice contained in Section 3.5 of BS 6472 states:

"The effect of building vibration on the people within is assessed by finding the appropriate vibration dose. Present knowledge shows that this type of vibration is best evaluated with the vibration dose value (VDV).

The VDV defines a relationship that yields a consistent assessment of continuous, intermittent, occasional and impulsive vibration and correlates well with subjective response"

- 4.69 The vibration dose value is a single figure descriptor that represents the cumulative dose of transient vibrations, taking into account the frequency spectrum and duration of each event. The measured values are weighted to account for the way in which people perceive building vibration, which is dependent on various factors, including the vibration frequency and direction.
- 4.70 For occupants within buildings, the frequency-weighting curve is defined in British Standard 6841: 1987 Measurement and Evaluation of Human Exposure to Whole-Body Mechanical Vibration and Repeated Shock. The vibration dose value is determined over a 16 hour daytime period or 8 hour night-time period, and the guidance in BS 6472 is as shown in Table 4.

Table 4: Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings, ms^{1.75}

Place and Time	Low probability of adverse comment ⁽¹⁾	Adverse comment possible	Adverse comment probable ⁽²⁾
Residential buildings 16h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Notes:

⁽¹⁾: Below these ranges adverse comment is not expected

⁽²⁾: Above these ranges adverse comment is very likely

- 4.71 BS 6472-1 also provides factors to adjust the criteria in Table 4 so that they may applied to lower sensitivity receptors:

"For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16 h day."

- 4.72 The above guidance relates to vibration measured at the point of entry into the human body, which is usually taken to mean the ground surface or at a point mid-span of an upper storey floor, rather than the point of entry into the building, for example a foundation element. Where the vibration is measured at another location, BS 6472 states that a

transfer function should be applied; however, BS 6472 does not itself contain any guidance on suitable transfer functions although it does reference other publications that contain transfer functions.

Typical Façade Sound Reduction Performance

- 4.73 The external façade, and/or roof, of a building typically provide significantly higher sound reduction performance than doors, windows and, if applicable, ventilators, and the overall sound reduction to bedrooms is usually dictated by the glazing and ventilator elements.
- 4.74 If the window is open or partially open then this becomes the dominant weak point in the façade and the level of sound reduction is inherently limited by the open window. Both the WHO *'Night Noise Guidelines for Europe'* as well as British Standard 8233: 2014 *'Sound insulation and noise reduction for buildings'* suggest that a sound reduction of 15dB can be expected across a partially-open window, which is widely adopted for assessment.
- 4.75 Identifying a single-figure 'typical' sound reduction value for a closed window is not as straightforward, because the level of sound reduction in any individual case will be dictated by a wide range of factors including the type and thickness of glazing, the size of window, the dimensions of the room in question, the construction and quality of the frames, seals and gaskets, the presence of in-frame (trickle) vents and the general state of repair.
- 4.76 Many different window types exist on residential properties which may be affected by noise from the proposed development, including UPVC/timber/aluminium framed double glazing, and timber frame sash and side-hung single glazed windows. The most robust approach would therefore be to assume that there are a significant number of properties with windows offering relatively poor sound reduction. Conversely, there could also be dwellings in the study area with thick, heavy glass and/or high performance frames and seals which would provide relatively high sound reduction.
- 4.77 There is a need to define a 'typical' level of sound reduction that can reasonably be considered to represent as many dwellings in the study area as possible to allow the application of external acoustic criteria that reflect expected effects within properties. It is reasonable to assume that most dwellings will have some form of insulating thermal double glazing in a wood, metallic or UPVC frame and in a moderate state of repair. On this basis, the typical sound reduction for windows of this type can be identified.
- 4.78 The sound reduction performance of windows is most commonly expressed as a weighted sound reduction index (SRI) with the performance presented in terms of dB R_w . The R_w is a single-number quantity which characterises the performance over a range of frequencies. A spectral adaptation term C_{tr} is often added to the R_w value to represent the performance relative to transportation noise sources which feature significant low-frequency content, e.g. road traffic and diesel locomotives.
- 4.79 Information on performance of window is published in British Standard 12758:2011 *'Glass in building — Glazing and airborne sound insulation — Product descriptions and determination of properties'*. This standard is often used by glazing and acoustics professionals as a reliable reference point for window performance. Table 4 of BS 12758 provides typical sound reduction performance data for a variety of windows types, presented as dB R_w and $R_{w+C_{tr}}$ indices, and advises that basic thermal double glazing, i.e. 4/(6-16)/4mm glass configuration, will typically achieve a lab-tested weighted sound reduction of 29dB R_w (25dB $R_{w+C_{tr}}$).

- 4.80 This level of performance is considered typical of commercially-available double glazing, which is supported by technical data provided by leading glass manufacturers in the UK:

Pilkington 4/(6-16)/4 insulating double glazing = 29dB R_w / 25dB R_{w+Ctr}

Saint-Gobain Solaglass 4/12/4mm double glazing = 29dB R_w / 26dB R_{w+Ctr}

Guardian 4/16/4mm double glazing = 30dB R_w / 26dB R_{w+Ctr} .

- 4.81 It should be noted that many of the window types likely to exist adjacent to the proposed activities would be unlikely to achieve the performance levels stated above under laboratory conditions; this is particularly the case for many of the older and/or timber-frame single-glazed windows. The R_w and R_{w+Ctr} values given by the manufacturers represent the glass only; where the frames are deteriorated or otherwise inefficient, the in-situ performance could be significantly lower.
- 4.82 However, there is no reliable way to calculate the in-situ outside-to-inside sound reduction from the lab-tested performance without looking at each case on an individual basis taking into account the various defining factors, such as those listed above. The in-situ performance in many instances may be 3-4dB lower than the lab-tested R_w value and thus a figure of 25dB has been adopted as the typical in-situ outside-to-inside sound reduction for basic thermal double glazing. This ties in with typical design tolerances for façade sound insulation (+/- 3dB) and is also identical to the R_{w+Ctr} value of 25dB given in BS 12758.
- 4.83 The C_{tr} correction is often applied for transportation noise with significant low-frequency content (e.g. diesel locomotives) and for such situations the R_{w+Ctr} can be a reliable indicator of in-situ sound reduction.
- 4.84 In conclusion, it is necessary to adopt a reasonable value for the typical sound reduction provided by a closed bedroom window. In view of the wide variety of window types and other site conditions that are likely to occur at the receptors in the relevant study area, it is reasonable to assume that most dwellings will have at least basic thermal double glazing, although this may not be the case at all receptors. Based on the relevant British Standard (BS 12758) and current technical data provided by leading glazing manufacturers, a typical in-situ sound reduction of 25dB for noise is considered a reasonable value to use.

5.0 Approach to Assessment and Criteria

- 5.1 This section describes the criteria, with references to relevant standards and other technical guidance, that has been adopted for each potential source of noise and/or vibration associated with the proposed construction and operation of Sizewell C nuclear power station. The reasoning behind the selection of criteria is set out where relevant.
- 5.2 All values for noise parameters will be assessed using a fast time weighting, with the exception of ground-borne noise, which uses a slow time weighting.

Construction Noise

- 5.3 The approach taken to evaluate noise effects for all construction work associated with the project on occupiers of dwellings and other permanent residential accommodation is that outlined in Part 1 of BS 5228. This recommends that, for dwellings, significant effects may occur when the site noise level, rounded to the nearest decibel, exceeds the value listed in Table 5 below. The table is used as follows: for the appropriate period (daytime, evening, night-time, weekends), the pre-construction ambient noise level is determined and rounded to the nearest 5dB. This rounded value is compared to the Category A criteria in Table 5 and depending on whether the rounded values are below, equal to, or above the Category A values, the Category A, B or C criteria will apply to the construction works as an indicator of significant impacts.
- 5.4 The predicted construction noise levels are compared to those derived criteria and a potential significant effect is deemed to occur where the derived criteria are exceeded.
- 5.5 The guidance on levels and significance is designed specifically for use for residential receptors; for this assessment it is also applied to other permanent residential accommodation.

Table 5: Thresholds of potential significant effect at dwellings, from Part 1 of BS 5228

Period	Assessment Category		
	A	B	C
Day: Weekdays, 0700-1900, Saturday, 0700-1300	65dB $L_{Aeq,T}$	70dB $L_{Aeq,T}$	75dB $L_{Aeq,T}$
Evenings and weekends: Weekdays 1900-2300, Saturdays 1300-2300 Sundays 0700 - 2300	55dB $L_{Aeq,T}$	60dB $L_{Aeq,T}$	65dB $L_{Aeq,T}$
Every day 2300 - 0700	45dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$

Notes:

Assessment Category A: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are less than these values;

Assessment Category B: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are the same as category A values; and

Assessment Category C: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5dB) are higher than category A values.

If the ambient sound level exceeds the Assessment Category C threshold values given in the table (i.e. the ambient sound level is higher than the above values), then an impact is deemed to occur if the total $L_{Aeq,T}$ sound level for the period increases by more than 3dB due to construction activity.

- 5.6 As recommended in LA111¹ and as adopted for HS2, a significant effect is deemed to occur where the relevant criterion is exceeded for the following periods of time:
- 1) 10 or more days or nights in any 15 consecutive days or nights;
 - 2) a total number of days or night exceeding 40 in any 6 consecutive months.
- 5.7 As noted above, the thresholds are appropriate for residential receptors, and is also applied to other permanent residential accommodation. There is no guidance on what thresholds might be suitable for receptors with a higher or lower sensitivity.
- 5.8 BS5228-1 does not state whether the values in Table 5 above are free field or façade values. Since applying these as façade values results in a more onerous assessment, this approach has been used on a precautionary basis.
- 5.9 Since high sensitivity receptors would be so due to specific and potentially unique circumstances, the assessment for these receptors will be considered by a bespoke method, relevant to local circumstances.
- 5.10 People in low sensitivity receptors, such as offices, may be adversely affected by construction noise and there are no recommended levels that would apply. A precautionary approach has been taken, and the same assessment criteria used for the assessment of impact magnitude for both medium (residential) and low sensitivity receptors.
- 5.11 Construction noise is less likely to have an adverse effect on receptors with very low sensitivity, such as industrial and commercial buildings, and there are no standards that suggest criteria which might be suitable in these circumstances. Where sensitivity to construction noise is a concern for a very low sensitivity receptor, a site-specific method is used.
- 5.12 The values to be used to assess the magnitude of impact for construction work from all construction work, other than the main development site are as shown in Table 6.

¹ Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration

Table 6: Values to be used to assess the magnitude of impact for construction work from all sites other than the main development site

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium and low	Day	Below baseline values	Baseline noise levels	ABC ⁽¹⁾⁽²⁾	ABC ⁽¹⁾⁽²⁾ + 10	L _{Aeq, 12h} ,dB
	Evening					L _{Aeq, 4h} ,dB
	Night					L _{Aeq, 8h} ,dB
Very low	Any	Bespoke assessment method to be used				

(1) Note ABC indicates the significance threshold from Table 5 above, based on the “ABC method” from BS 5228-1

(2) Note Where levels are predicted as free field values, the ABC criteria are reduced by 3dB, to account for the difference between free field and façade levels

Construction noise affecting receptors close to the Main Development Site

5.13 In addition to recommending that the values in Table 5 above are used, Part 1 of BS 5228 advises that other project-specific factors, such as the number of receptors affected and the duration and character of the impact need to be considered to determine if there is a significant effect. In the case of Sizewell C main development site, there are a number of factors which suggest that a different level may constitute a significant effect. These comprise:

- Duration of the construction work at the main development site, which would take place over a 10 to 12 year period, which is longer than many construction periods.
- The project involves some long term earthmoving which, if carried out on its own, could be subject to lower noise control limits.
- Noise from the site as a whole would include a number of noise sources that are not typically associated with traditional construction works, such as vehicle movements around the site and car parking areas, activities within the campus and security areas, and railway movements. As a result of this, the L_{Amax} parameter has been included within the assessment criteria, since this would apply to some of these sources, if assessed alone. (Note that the L_{Amax} parameter is important for the consideration of sleep disturbance only and therefore would not be relevant for the assessment of effect at low or high sensitivity receptors, as people would not be expected to sleep within these).

5.14 As a result and with regard to the existing ambient levels in the area, the levels in Table 6 above have been reduced and simplified for the assessment of effects to receptors affected by noise from the main development site. These are set out in Table 7 below.

Table 7: Values to be used to assess the magnitude of impact for construction work and other sources other than mechanical services at the main development site (all values are free field)

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	Below baseline noise levels	Baseline noise levels	>60	>70	L _{Aeq, 16h} ,dB,
	Night			>45	>55	L _{Aeq, 8h} ,dB,
		<60	60	>65	>70	L _{Amax} ,dB,
Low	Day	Below baseline noise levels	Baseline noise levels	>60	>70	L _{Aeq, 16h} ,dB,
	Night			>45	>55	L _{Aeq, 8h} ,dB,
Very low	Any	No assessment normally required				

Note: These levels only apply to construction noise from the main development site. Where construction work at other sites are considered within the main development site chapter, for example the Fen Meadows and Sports Pitches at Leiston Sports Centre, these are considered using the thresholds in Table 5.

LOAEL and SOAEL values for construction noise

- 5.15 There are no commonly-used levels in guidance that can be directly applied as LOAELs; Part 1 of BS 5228 does not contain any specific advice about levels below which noise would not be a problem. The only published guidance that recommends an approach to setting LOAELs for construction noise is in LA111, which recommends that the baseline noise levels, $L_{Aeq,T}$ be used as the LOAEL for the construction of roads. This approach has been adopted to set a LOAEL values for construction noise on this project.
- 5.16 The sound levels that are considered the SOAELs for construction noise are set out in Table 8 below. These are levels identified in Part 1 of BS 5228 that, if exceeded for ‘significant’ periods of time, either continuously or sporadically, could result in “widespread community disturbance, or interference with activities or sleep is likely to occur”. For construction noise to lead to adverse effects in the terms envisaged by planning policy, the levels in Table 8 would need to be exceeded for 10 or more days or nights in any 15 consecutive days or nights, or for a total of 40 days or nights in any 6 consecutive months. The time periods set out in Part 1 of BS 5228 have been adjusted to align with the ABC criteria.

Table 8: Table of values to use for SOAEL from all construction work associated with the development, façade dB

Day	Time (hours)	Averaging Period T	Significant Observed Adverse Effect Level $L_{Aeq,T}$ (dB)
Mondays to Fridays	0700 – 0800	1 hour	70
	0800 – 1800	10 hours	75
	1800 – 1900	1 hour	70
	1900 – 2300	4 hours	65

Saturdays	0700 – 0800	1 hour	70
	0800 – 1300	5 hours	75
	1300 – 1400	1 hour	70
	1400 - 2300	1 hour	65
Sundays & Public Holiday	0700 – 2300	1 hour	65
Any night	2300 – 0700	1 hour	55

Construction vibration

- 5.17 NPS EN-1 specifically states the need to consider construction vibration “which can cause damage to buildings”. The need to consider the potential impact of vibration on human receptors is also required, albeit under the overall “references to “noise” below apply equally to assessment of impacts of vibration” statement in paragraph 5.11.1. Since the levels at which damage to buildings will occur is typically significant above the thresholds at which there may be an adverse effect on human receptors, this section considers the potential effects on human, which will also avoid damage to buildings. The risk of structural damage due to construction vibration would be considered with reference to criteria set out in Part 2 of BS 7385: 1993. According to guidance in Part 2 of BS 5228, the lowest threshold at which this might occur would be where the vibration level exceeds 15mm/s, PPV.
- 5.18 Guidance on the measurement, prediction, assessment and control of ground-borne vibration generated from construction and open sites is contained in BS 5228: 2009+A1: 2014 ‘Code of practice for noise and vibration control on construction and open sites. Vibration’ (Part 2 of BS 5228).
- 5.19 BS 5228 Part 2 states that the threshold of human perception to vibration is typically in the range of 0.14mm/s to 0.3mm/s. Above these values, vibration “can disturb, startle, cause annoyance or interfere with work activities” and that at much higher levels “they can be described as unpleasant or even painful”.
- 5.20 BS 5228 Part 2 clarifies that at 0.14mm/s “Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.”
- 5.21 At 0.3mm/s, vibration “might be just perceptible in residential environments”.
- 5.22 At 1 mm/s “it is likely that vibration...will cause complaint, but can be tolerated if prior warning and explanation has been given”.
- 5.23 It follows that the lowest vibration level that is likely to give rise an adverse effect in a residential setting lies between the threshold of perception at 0.3mms and the point at which complaints will occur at 1mm/s.
- 5.24 BS 5228 Part 2 states that at 10 mm/s vibration “is likely to be intolerable for any more than a very brief exposure”.

- 5.25 Guidance on effects of vibration sources during construction of road schemes is contained within LA 111. This recommends using the values 0.3mm/s, PPV and 1.0mm/s PPV for LOAEL and SOAEL thresholds respectively, for both day and night. It also suggests that a high magnitude of impact would occur where vibration levels exceed 10mm/s. These values align with guidance in Part 2 of BS 5228 and thus have been adopted for construction vibration for the project as a whole.
- 5.26 Since high sensitivity receptors would be so due to specific (and potentially unique) circumstances, the assessment of this type of noise source on these receptors will be considered by a bespoke method, relevant to local circumstances. Construction vibration is unlikely to have an adverse effect on receptors with very low sensitivity (such as industrial and commercial buildings) and there are no standards which suggest criteria which might be suitable in these circumstances.
- 5.27 For the assessment of magnitude, Table 9 below (also based on guidance in LA111) will be used.

Table 9: Vibration – magnitude of impact (all construction sources) for human receptors (day or night)

Sensitivity of receptor	Magnitude of impact				Parameter
	Very low	Low	Medium	High	
High	Bespoke assessment method to be used				
Medium and low	<0.3	0.3	1	>10	PPV mm/s
Very low	No assessment normally required				

- 5.28 Construction vibration shall be considered significant where it is major or moderate adverse and occurs for a duration exceeding:
- 1) 10 or more days or nights in any 15 consecutive days or nights; or
 - 2) a total number of days or nights exceeding 40 in any 6 consecutive months.

LOAEL and SOAEL values for construction vibration

- 5.29 Vibration levels from all construction sources are assessed against the LOAEL and SOAEL threshold values in Table 10. Where higher sensitivity receptors exist, significance would depend on the nature of the sensitivity and significance thresholds would need to be considered on a site by site basis.
- 5.30 The values in Table 10 are informed by the guidance in BS 5228-2, which indicates that vibration at 0.3mm/s is just perceptible in a residential setting, and at 1mm/s, complaints will occur. The LOAEL is therefore set at the lower end of this range.
- 5.31 The SOAEL is taken to be the point at which vibration is intolerable for more than a brief exposure; this represents a level that should be avoided.

Table 10: LOAEL and SOAEL values for construction vibration (all construction sources) for medium and low sensitivity receptors

LOAEL	SOAEL	Parameter
0.3	10.0	PPV mm/s

Operational power station and other mechanical services assessment criteria

- 5.32 To assess noise from the operational power station; mechanical ventilation plant; chillers and heating systems associated with the operation of the AD sites and campus facilities, guidance within BS 4142 will be used to determine significance. BS 4142 states that, to consider the effects of noise from such plant, subtracting the background sound level from the rating noise level, where both are determined in accordance with the procedures set out in that standard, will give the following initial outcomes:

“A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”

“A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

- 5.33 Once the level difference is established, this must be considered in context, as described in BS 4142, to decide the overall magnitude of impact.
- 5.34 Based on this approach, the initial magnitude of impact is defined by the difference between the rating and background sound levels as shown in Table 11, prior to any consideration of context. “BG” in this table is shorthand for background sound level, L_{A90} , dB, assessed in accordance with the procedures in BS 4142. Day is taken to be 07:00 to 23:00 hours and night is 23:00 to 07:00 hours.

Table 11: Values to be used to assess the magnitude of impact for operational power station and other mechanical services, all values are free field.

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium or Low	Day	<BG+0*	BG+0*	BG+5*	BG+10*	L _{Ar} 1 hour,dB
	Night					L _{Ar} 15 mins,dB
Very low	Any	No assessment normally required				

* All assessments of significance must be considered in the context in which the sound occurs, in accordance with the guidance in BS 4142: 2014+A1: 2019.

- 5.35 The scope of BS 4142 states that it is to be used, “to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”. As such, no guidance is available for the assessment of

sound from these types of noise source on receptors with other sensitivities. Since high sensitivity receptors would be so due to specific and potentially unique circumstances, the assessment of this type of noise source on these receptors will be considered by a bespoke method, relevant to local circumstances. Noise from these types of source is unlikely to have an adverse effect on receptors with very low sensitivity, such as industrial and commercial buildings, and there are no standards which suggest criteria which might be suitable in these circumstances.

- 5.36 Since people in low sensitivity receptors, such as offices, may be adversely affected by these sound sources and there are no alternative criteria that would apply, a precautionary approach has been taken, to use the same assessment criteria for the assessment of magnitude of levels for both medium and low sensitivity receptors.

Note on context where noise levels are low

- 5.37 In general, background and ambient noise levels in the vicinity of the main development site are low. The absolute level of sound needs to be considered when looking at context in this situation. BS 4142 advises that:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

- 5.38 The latest version of BS 4142 does not ascribe a numerical value to what is meant by “low”. However, earlier versions of BS 4142 described 30dB, L_{A90} as a “very low” background level and a rating level of 35dB, L_{Ar} as “very low”. A value of 30dB, L_{A90} as a low background is also generally adopted by other schemes with the potential to affect rural areas, such as HS2.

- 5.39 Since this consideration only applies in locations where the existing background sound levels are low, for night time, it is appropriate to select a level below which there is a very little likelihood of sleep disturbance. According to the WHO’s *‘Night Noise Guidelines for Europe’*, there is “no sufficient evidence that the biological effects observed at the level below 40dB $L_{night, outside}$ are harmful to health”. On this basis, a value of 40dB, L_{night} represents a level above which an adverse effect might begin to occur in locations with low background at night.

- 5.40 There is no equivalent value that can be cited for the daytime, so BS 4142 is considered to be best indicator of likely effect down to its own stated limitations.

- 5.41 Some locations around the main development site have low noise levels and the potential long term effects of noise from the operational power station on the tranquil character of these spaces is considered in the Amenity and Recreation Chapter, using the methods described later in this document.

LOAEL and SOAEL values for the operational power station and other mechanical services plant

- 5.42 The lowest level at which any adverse effect could be observed would be at a level equal to background. This value has been used for both low and medium sensitivity receptors.
- 5.43 For medium sensitivity receptors, a SOAEL would occur at the level defined within BS 4142 as being, “an indication of a significant adverse impact”, i.e. 10dB above background, depending on context. Since many receptors will have a pre-existing background level

which is low, in the circumstances where a typical existing background level is low (below 30dB, L_{A90}), for a level to be considered to be above the SOAEL, it would also need to be above 55dB, L_{night} or, if this were to occur in the day, it would need to be above 60dB, $L_{Aeq, 16 \text{ hours}}$. These two additional thresholds come from the NNGE (as an interim target) and internal day time design target of 35dB, $L_{Aeq, 16h}$ (from BS 8233) which would not be achieved with an external level of more than 60dB with a closed window providing sound reduction of 25dB.

- 5.44 Low sensitivity receptors will often not be in use at night and where they are, people would be working so a level which would guard against sleep disturbance would not be appropriate.
- 5.45 A reasonable internal noise level for low sensitivity receptors can be derived from guidance in BS 8233, for the design of noise levels for internal workspaces. This suggests that an open plan office would require levels of 45 to 50dB, $L_{Aeq,T}$ when unoccupied, and for workspaces requiring concentration, the following levels are recommended:
- Library, gallery, museum 40 – 50dB, $L_{Aeq,T}$
 - Staff/meeting room, training room 35 – 45dB, $L_{Aeq,T}$
 - Executive office 35 – 40dB, $L_{Aeq,T}$
- 5.46 From this, a value of 40dB, $L_{Aeq,T}$ can be taken to be a reasonable level for such internal spaces and, since working hours are generally 8 hours per day, the value for T in this case would be 8 hours. On this basis, in order to achieve a level of 40dB, $L_{Aeq, 8h}$ for these spaces with a closed window providing sound reduction of 25dB, the external level at which a significant change of behaviour would occur would be 65dB, $L_{Aeq, 8h}$.
- 5.47 As noted above, the WHO suggests that a value of 40dB, L_{night} represents a level above which an adverse effect might begin to occur in locations with low background at night. Below this threshold, no adverse effect is considered likely.
- 5.48 For the daytime, there is no equivalent lower threshold below which adverse effects can be said to be unlikely in all circumstances. BS 4142 is therefore considered to be best indicator of likely effect down to its own stated limits.
- 5.49 Table 12 contains LOAEL and SOAEL values for noise from these sources. Again, “BG” in this table is shorthand for background noise level, $L_{A90,dB}$, assessed in accordance with the procedures in BS 4142.

Table 12: LOAEL and SOAEL values for operational power station and other mechanical services (all values are free field values)

Period	Sensitivity of receptor	LOAEL	SOAEL
Day	Medium	BG+0dB, $L_{Ar,dB}$	BG+10, L_{Ar} or Above 60dB, $L_{Aeq, 16h}$, whichever is the higher
	Low		65dB, $L_{Aeq, 8h}$
Night	Medium	BG+0dB, $L_{Ar,dB}$ or 40dB L_{night} , whichever is the higher ¹	BG+10, L_{Ar} or Above 55dB, $L_{night,dB}$, whichever is the higher
	Low (if occupied at night)		65dB, $L_{Aeq, 8h}$

Note: 1 – The 40dB L_{night} threshold is stated as a lower cut-off for the LOAEL at night as there is unlikely to be an adverse effect below this level. This is part of the contextual consideration required by BS 4142, embedded in the definition of the night-time LOAEL.

Road traffic noise (RTN)

- 5.50 To construct Sizewell C nuclear power station, there will be an increase in road traffic flows during the construction period, including more HGVs and buses and this is likely to result in an increase in RTN. As a result of an early review of likely effects of this increase in road traffic, which included the effects of noise, and in response to consultation with stakeholders, as decision was made to create two new roads, known as Sizewell link road and the two village bypass and to upgrade the junction between the A12 and the B1122 at Yoxford to a roundabout.
- 5.51 The effects of these changes to RTN at nearby NSRs will be considered using guidance in LA 111 ‘Noise and vibration’ (published in November 2019 as part of DMRB). The changes in level will be considered as detailed below.
- 5.52 RTN changes as the result of the operation of new road schemes and as a result of construction road traffic on new roads will use the approach in the “Operational noise assessment” of LA 111.
- 5.53 The magnitudes of noise changes are determined according to Tables 13 and 14 below for short term (opening year) and long term (future year) effects respectively. For clarity, the changes could be either positive or negative in which case the effects could be either adverse or beneficial.

Table 13: Short term magnitude of changes in road traffic noise level – from LA 111

Short term magnitude	Short term noise change (dB L _{A10,18hr} or L _{night})
Major or high	Greater than or equal to 5.0
Moderate or medium	3.0 to 4.9
Minor or low	1.0 to 2.9
Negligible or very low	less than 1.0

Table 14: Long term magnitude of changes in road traffic noise level – from LA 111

Long term magnitude	Short term noise change (dB L _{A10,18hr} or L _{night})
Major or high	Greater than or equal to 10.0
Moderate or medium	5.0 to 9.9
Minor or low	3.0 to 4.9
Negligible or very low	less than 3.0

- 5.54 For noise sensitive receptors where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, local circumstances, must also be considered to determine the final significance. Details of how this should be done are included Table 3.60 in LA 111, which is reproduced in Table 15.

Table 15: Determining final operational significance on noise sensitive buildings – from LA111

Local circumstances	Influence on significance judgement
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	1) Noise level changes within 1dB of the top of the 'minor' range can indicate that it is more appropriate to determine a likely significant effect. Noise level changes within 1dB of the bottom of a 'moderate' range can indicate that it is more appropriate to consider a change is not a likely significant effect.
Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	1) Where a greater impact in the long term and/or future year is predicted, it can be more appropriate to consider that a smaller change is a likely significant effect. A lower impact in the long-term and/or future year over the short-term can indicate that it is more appropriate to consider that a larger change is not significant. 2) A similar change in the long term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect.
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	1) A noise change where all do-something absolute noise levels are below SOAEL requires no modification of the initial assessment. 2) Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect.
Location of noise sensitive parts of a receptor	1) If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short term and/or long term is not a likely significant effect. 2) An example of this would be where no windows of sensitive rooms face the road, and outdoor spaces are protected from the road by buildings. 3) Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short term and/or long term is a likely significant effect. 4) An example of this would be when a house has many windows of sensitive rooms and outdoor spaces facing the road. 5) It will only be necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal.
Acoustic context	1) If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect.

Local circumstances	Influence on significance judgement
Likely perception of change by residents	<p>1) If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the noise sensitive receptors. In these cases it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect.</p> <p>2) Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect.</p>

5.55 LA 111 does not provide advice for a scenario in which a new road opens and from the time of opening, flows are above expected “normal” flows as a result of addition of construction traffic serving a nearby project. The way in which the LA 111 method is implemented to address this scenario is covered in the relevant noise chapters

5.56 The effect of construction road traffic on existing roads is considered as specified in LA 111 within the Construction Noise section. This recommends that, for the assessment of construction traffic, the,

“... study area shall be defined to include a 50m width from the kerb line of public roads with the potential for a [sic] increase in baseline noise level (BNL) of 1dB(A) or more as a result of the addition of construction traffic to existing traffic levels.”

5.57 It suggests that the magnitude and effects of noise should be assessed using the values in Table 16 below. These values will be used for the assessment of magnitude of effect of Sizewell construction road traffic noise on existing roads.

Table 16: Magnitude of changes in road traffic noise level – from LA 111

Magnitude of impact	Increase in BNL of closest public road used for construction traffic (dB)
Major or high	Greater than or equal to 5.0
Moderate or medium	Greater than or equal to 3.0 and less than 5.0
Minor or low	Greater than or equal to 1.0 and less than 3.0
Negligible or very low	Less than 1.0

5.58 LA 111 states that:

“Construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

1) 10 or more days or nights in any 15 consecutive days or nights;

2) a total number of days exceeding 40 in any 6 consecutive months.”

- 5.59 LA 111 does not contain guidance for the assessment of long term changes on a road network as a result of a new, non-road development. The assessment of the long term effects of changes in road traffic flows on surrounding roads during the operation of Sizewell C nuclear power station has therefore been assessed in the same way as the change during construction traffic on the existing road network except that the magnitudes of these changes have been considered against the values for long term effects set out in Table 14 above.
- 5.60 All sources of guidance on the assessment of noise from road traffic relate to the potential effects on residential or human receptors, which are defined as medium sensitivity receptors in this assessment. As a result of this, the criteria used for assessment of road traffic noise refer only to medium sensitive receptors. Where high sensitive receptors exist, these would be considered on a case-by-case basis, dependent on the reason for the high sensitivity.
- 5.61 Long term, or permanent, changes to tranquillity resulting from the proposed new road schemes are dealt with in detail in the amenity and recreation chapters (**Volumes 5 and 6 Chapter 8**) using the method set out later in this document. These assessments include a consideration of the potential long term changes to areas which have a tranquil character using the Natural Tranquillity Method as the basis for the assessment. Landscape features are also considered within these assessments, as recommended by LA 111.

LOAEL and SOAEL values for road traffic noise

- 5.62 LA111 provides defined values for use for the assessment of the operation of new road schemes, as shown in Table 17 below, and these are adopted for the assessment of new roads associated with the proposed development.
- 5.63 LA111 does not state whether the values should apply to existing roads as well as new or amended roads. A precautionary approach has been adopted, whereby, it is considered that the SOAELs and LOAELs could be applied to both existing and new or amended roads, but it should be recognised that development-generated traffic would need to be a substantial cause of any exceedances, and that exceedances that pre-date the project are not considered to result from the project.
- 5.64 To test whether the proposed development is a substantial cause of the exceedance, or to measure whether the proposed development is the cause of an existing exceedance becoming greater, a change in traffic noise of at least +1dB must also occur as a result of the development-generated traffic.

Table 17: LOAEL and SOAEL values recommended in LA 111

Time Period	LOAEL	SOAEL
Day (06:00-24:00)	55dB $L_{A10,18hr}$ facade	68dB $L_{A10,18hr}$ façade
Night (23:00-07:00)	40dB L_{night} outside (free-field)	55dB L_{night} outside (free-field)

- 5.65 It should be noted that the time period for the night time has been adjusted to match the time period for the L_{night} noise index, i.e. 23:00 to 07:00 hours, from the time periods sated in LA111, which did not align with the definition of L_{night} .

Rail noise

- 5.66 Paragraph 5.11.5 of NPS EN-1 states that the noise impact of rail movements associated with the development should also be considered as part of the assessment. Vibration from rail operation is not specifically mentioned, but NPS EN-1 does refer to '*Noise and vibration*' holistically as well as stating the need to consider construction vibration "*which can cause damage to buildings*". This is considered along with the potential for impacts on humans from railway vibration as the basis for assessing noise and vibration generated by operational rail services associated with the proposed construction of Sizewell C.
- 5.67 New rail operation in this case refers to freight train movements on the proposed new line known as the green rail route, and reactivated railway operation refers to freight trains using the existing branch line through Leiston which would be upgraded as part of the proposed development, and a new rail spur constructed on the Land East of Eastlands Industrial Estate.
- 5.68 There will also be freight train movements along existing sections of the East Suffolk line. The intensification of use of the East Suffolk rail line by the operator, which may involve running additional night time trains, is permitted by legislation without the need for any assessment of environmental impact. However, an assessment has been carried out in this case, as the changes would be brought about by the construction of Sizewell C Power Station. In the same way that LA 111 requires changes in noise on existing roads to be assessed differently from changes brought about by new or amended roads, the same approach is adopted for rail noise.
- 5.69 There are no clear British Standard or Government-endorsed methods for assessing the potential impact of noise from changes in railway noise, in the same way that there is for road traffic noise.
- 5.70 The Institute of Environmental Management and Assessment (IEMA) produced '*Guidelines for Environmental Noise Impact Assessment*' in October 2014, and the guidance contained in that document has been taken into account here.
- 5.71 To determine the potential impact of changes in the sound environment, it is first necessary to determine an appropriate impact scale that refers to known indicators of human response to sound.
- 5.72 The IEMA Guidelines state:
- "Measuring in decibels means that a 3dB increase is equivalent to a doubling of the sound energy, and a 10dB increase is a tenfold increase in energy. For broad band sounds which are very similar in all but magnitude, a change or difference in noise level of 1dB is just perceptible under laboratory conditions, 3dB is perceptible under most normal conditions, and a 10dB increase generally appears to be twice as loud. These broad principles may not apply where the change in noise level is due to the introduction of a noise with different frequency and/or temporal characteristics compared to sounds making up the existing noise climate. In which case, changes of less than 1dB may be perceptible under some circumstances." A tenfold increase in energy is commonly perceived to be twice as loud.
- 5.73 Since the impact scale is to be used to determine the potential impact of changes in railway noise, i.e. where the source does not materially change in character, it is considered appropriate to set the lowest threshold of audibility at 3dB. The IEMA Guidelines suggest that smaller changes in noise level would only be perceptible where the sound materially changes character.

- 5.74 The impact scale adopted for the assessment of changes in rail traffic noise is shown in Table 18. The categories have been related to the guidance in the NPPF, NPSE and the PPG for noise and apply to residential, or medium sensitivity, receptors. Where the resultant noise level from a change is below a threshold at which an adverse effect might begin to occur, the effect would be negligible, so the values in Table 18 only apply where the resultant “with development” levels are above this threshold. Adopting precautionary approach, the categories are considered to also apply to low sensitivity receptors.
- 5.75 It may be appropriate to adopt the same categories for high sensitivity receptors, however these should be judged on a case-by-case basis.

Table 18: Impact scale for comparison of future railway noise against existing railway noise

Change in Noise Level dB(A)	Subjective Response	Magnitude of Impact
0	Not present	No change*
0.1 to 0.9	Unlikely to be noticeable	Very low*
1.0 to 2.9	Present but unlikely to be intrusive	Low*
3.0 to 9.9	Present and potentially intrusive, particularly at higher end of scale	Medium*
10.0+	Present and disruptive	High*

**Note: Where the resultant noise level is below a low threshold of effect (see Table 19 below), then the effect would be negligible, irrespective of the magnitude of change.*

- 5.76 In addition to the use of the impact scale set out in Table 18 to assess the potential impact of changes in railway noise on existing lines, consideration has been given to short duration or peak event noise.
- 5.77 BS 8233 is referenced in NPS EN-1 as a potential source of guidance for noise and vibration, the current version of which is BS 8233: 2014 ‘*Guidance on sound insulation and noise reduction for buildings*’. It states that “regular individual noise events”, such as passing trains, can cause sleep disturbance and that “a guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night”. No specific guideline criteria are recommended in BS 8223.
- 5.78 Guidance can be found in the 1999 WHO guidelines, which recommend that internal levels should not exceed 45dB, L_{Amax} ; the 2018 guidelines suggest that sleep disturbance from rail noise may be properly considered using the L_{Amax} parameter, explaining that the guidance in the 1999 guidelines remain valid for the assessment of internal levels. It is not possible to accurately predict noise ingress to receptors from freight train passes due to the varying construction specification of dwellings on this route. Regardless of façade construction, external noise ingress is typically dictated by the sound reduction provided by the windows, vents or other penetrations through the building envelope. Should these windows be partially open, such as for ventilation or cooling, then sound reduction would be inherently limited to approximately 15dB according to BS 8233. When applied to the internal LOAEL threshold of 45dB L_{Amax} results in an external LOAEL threshold value of 60dB L_{Amax} from any train pass.
- 5.79 If the windows are closed then building envelope sound insulation increases significantly, with typical double glazing providing a sound reduction of at least 25dB, assuming a reasonable state of repair. This results in an external value for dwellings of 70dB L_{Amax} at which a moderate adverse level (and therefore a significant effect) would occur. At night,

the L_{Amax} criteria from Table 19 below would apply in addition to the assessment criteria in Table 18 for freight movements to and from Sizewell construction site on the East Suffolk line.

- 5.80 These maximum sound level thresholds have been factored into the assessment of railway noise on existing lines in addition to the impact scale contained in Table 18.
- 5.81 For new or altered railway lines, it is necessary to consider absolute thresholds as indicators of impact magnitude, since the introduction of a new railway line in particular, will inevitably result in a large change from the existing acoustic climate.
- 5.82 The primary source of guidance on noise levels which would require action to avoid a significant effect are the '*Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996*' (NIR 1996). These Regulations provide thresholds above which noise insulation should be provided for dwellings and other buildings used for residential purposes, subject to two other tests that consider the change in railway noise and the contribution of trains on the new or amended line to that future railway noise level.
- 5.83 These thresholds provide a useful reference when considering a level that would be considered to be a SOAEL for rail noise associated with new or altered lines.
- 5.84 For residential receptors, which are medium sensitivity receptors in the Sizewell C assessment, a moderate adverse effect would occur when a closed window providing sound reduction of 25dB would not result in acceptable internal levels. Internal noise levels for day and night, according to guidance within BS 8233 would need to be below 35dB, $L_{Aeq,16h}$ during the day and 30dB, $L_{Aeq,8h}$. A significant effect would therefore occur at 25dB above these values: i.e. at 60dB, $L_{Aeq,16h}$ during the daytime and at 55dB, $L_{Aeq,8h}$ during the night-time. This night-time level coincides with the WHO '*Night Noise Guidelines for Europe*' (2009), which recommended an Interim Target of 55dB L_{night} outside dwellings at night.
- 5.85 Low sensitivity receptors will often not be in use at night and where they are, people would be working so a level that would guard against sleep disturbance would not be appropriate.
- 5.86 A reasonable internal noise level for low sensitivity receptors can be derived from internal design guidance in BS 8233 for workspaces. This suggests that an open plan office would require levels of 45 to 50dB, $L_{Aeq,T}$ when unoccupied, and for workspaces requiring concentration, the following levels are recommended:
 - Library, gallery, museum 40 – 50dB, $L_{Aeq,T}$
 - Staff/meeting room, training room 35 – 45dB, $L_{Aeq,T}$
 - Executive office 35 – 40dB, $L_{Aeq,T}$
- 5.87 From this, a value of 40dB, $L_{Aeq,T}$ can be taken to be a reasonable level for such internal spaces and, since working hours are generally 8 hours per day, the value for T in this case would be 8 hours. On this basis, to achieve a level of 40dB, $L_{Aeq,8h}$ for these spaces with a closed window providing sound reduction of 25dB, the external level at which a significant change of behaviour would occur would be 65dB, $L_{Aeq,8h}$. For an open window (providing 15dB sound reduction), the threshold at which a low level of effect would occur would be 55dB, $L_{Aeq,8h}$.
- 5.88 Guidance on sleep disturbance and on the provision of sound insulation is relevant for dwellings, or other residential buildings only, which are classified as "medium sensitivity"

receptors. Since high sensitivity receptors would be so due to specific and potentially unique circumstances, the assessment of this type of noise source on these receptors will be considered by a bespoke method, relevant to local circumstances. Railway noise is unlikely to have an adverse effect on receptors with very low sensitivity, such as industrial and commercial buildings, and there are no standards that suggest criteria which might be suitable in these circumstances.

- 5.89 Since there is no available guidance to suggest a level at which there would be a negligible effect from railway noise, a level equal to existing baseline level in the absence of the development has been used for the assessment of magnitude. Table 19 summarises the impact categories applied to noise from new or altered railway lines.

Table 19: Thresholds for magnitude of impact for new or altered railway lines at different sensitivities, all values are free field

Sensitivity of receptor	Period	Magnitude of impact ⁽¹⁾				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	<50	50 ⁽²⁾	60	66	L _{Aeq, 16h} ,dB
	Night	<40	40 ⁽²⁾	55	59	L _{Aeq, 8h} ,dB
		<60	60 ⁽²⁾	70	77	L _{Amax} ,dB
Low	Day or night	<50	55 ⁽²⁾	65	66	L _{Aeq, 8h} ,dB
Very low	Any	No assessment normally required				

Note:

(1) Consideration of the scale of any changes in railway noise should also be considered, where there is existing railway noise.

(2) These are the values to use for the lowest threshold of effect referred to in Table 18 above

LOAEL and SOAEL values for railway noise

- 5.90 It has been common practice for rail developments to use the advice from the WHO 1999 'Community Guidelines for Noise' to derive a suitable LOAEL value. For HS2, the advice from WHO that "daytime sound levels of less than 50dB L_{pAeq} cause little or no serious annoyance in the community" led to the use of this value as the daytime LOAEL; this value has been adopted for this project for the same reasons. At night, the LOAEL thresholds are the same as the threshold at which a low effect can begin to be observed, i.e. 40dB, L_{night} and 60dB, L_{Amax}, as explained above. These LOAEL values are the low thresholds of effect referred to in the note for Table 17 above below which changes in level would not be considered to be adverse.
- 5.91 SOAEL values for average daytime and night-time levels have been set at values which are consistent with the NIR 1996 with suitable corrections for time periods and to convert these to free field values).
- 5.92 SOAEL values are set at the thresholds from the NIR 1996 would require the installation of sound insulation, notwithstanding that the NIR 1996 also requires consideration of the magnitude of change and the contribution of noise from the new or altered railway. The absolute levels specified in the NIR 1996 are:

Day: 68dB $L_{Aeq, 18h}$, façade level; and

Night: 63dB $L_{Aeq, 6h}$, façade level.

- 5.93 These levels can be converted to free field 16 and 8 hour values to provide SOAEL values using the same day and night time periods and parameters as for other noise sources and to be consistent with other standards and guidance. The daytime value of 68dB $L_{Aeq, 18hrs}$ can be converted to a 16 hour L_{Aeq} value so that a consistent set of values is attained, by subtracting 2dB, which includes a -3dB to remove the façade correction, and a +1dB correction to convert the 18 hour L_{Aeq} to a 16 hour L_{Aeq} . The resultant value is 66dB $L_{Aeq, 16hrs}$.
- 5.94 The night-time value of 63dB $L_{Aeq, 6hrs}$ can be converted to a 8 hour L_{Aeq} value to match the time period and noise index used elsewhere in this chapter, by subtracting 4dB, which includes -3dB to remove the façade correction, and a -1dB correction to convert the 6 hour L_{Aeq} to a 8 hour L_{Aeq} . The resultant value is 59dB $L_{Aeq, 8hrs}$.
- 5.95 In seeking to define a SOAEL for the relation to the L_{Amax} parameter, reference has been made to the 1982 paper A Synthesis of Studies on Noise-Induced Sleep Disturbance by Rice and Morgan, which considered the evidence available at that time on sound levels that might lead to sleep disturbance from specific sound sources. The paper concluded that instantaneous train sound levels of more than 85dB, measured at the façade of a dwelling, could result in significant disturbance to sleep, where there are 20 or fewer events per night. Where there are more than 20 events per night, significant disturbance to sleep could occur at a lower threshold of 80dB.
- 5.96 HS2 referenced research papers by Basner et al 'Aircraft noise effects on sleep: Application of the results of a large polysomnographic field study' (2006) and 'Single and combined effects of air, road and rail traffic noise on sleep and recuperation' (2011) in deriving L_{AFmax} criteria for their rail scheme.
- 5.97 The papers suggested that maximum sound levels in bedrooms should not exceed 65dB to avoid recalled awakenings, which is equivalent to an external sound level of 80dB, where there is a reduction of 15dB through an open window. This is similar to the findings of Rice and Morgan.
- 5.98 On this basis, where it is appropriate to set a planning policy threshold relating to instantaneous sound levels, it is considered that a façade level of 80 to 85dB L_{Amax} would form a reasonable basis for doing so.
- 5.99 HS2 Limited adopted these values as a night-time SOAEL for HS2; where noise from trains exceeded these values, noise insulation was offered to mitigate the significant adverse effect. HS2 Limited adopted these values, depending on the number of trains, as the SOAEL for HS2. As a recent assessment of a nationally significant rail scheme, it suggests that façade values in the region of 80 to 85dB L_{Amax} are appropriate values to adopt as the SOAEL. On a precautionary basis, the lower of these values has been used for this assessment: 80dB, L_{Amax} .
- 5.100 The LOAEL and SOAEL values for railway noise are shown in Table 20.

Table 20: LOAEL and SOAEL values for noise from operational level crossings (free-field values)

Time Period	LOAEL	SOAEL
Day (07:00-23:00)	50dB $L_{Aeq, 16h}$	66dB $L_{Aeq, 16h}$
Night (23:00-07:00)	40dB $L_{Aeq, 8h}$	59dB $L_{Aeq, 8h}$
	60dB, L_{Amax}	77dB, L_{Amax}

- 5.101 The L_{Amax} SOAEL may also be considered as an indicator of the upper threshold of acceptability for night-time railway noise on existing railway lines. Where the L_{Amax} criterion is used in this manner, consideration should also be given to existing night-time railway noise level

Rail vibration during operation

- 5.102 Vibration is generally experienced either as ground-borne vibration, which tends to be felt rather than heard, and re-radiated noise, where ground-borne vibration excites a building structure and is then re-radiated from internal surfaces as structure-borne airborne noise. This distinction is important and necessitates different assessment methods and criteria for ground-borne vibration and re-radiated ground-borne noise from operational rail.
- 5.103 The relevant policy statements do not provide prescriptive guidance on vibration assessment methodology although NPS EN-1 suggests that BS 6472 could be used; the current version of which is BS 6472: 2008 *'Guide to evaluation of human exposure to vibration in buildings. Part 1 Vibration sources other than blasting'* (BS 6472). BS 6472 can be used as a reference for predicting, assessing and managing ground-borne vibration.
- 5.104 Section 6 of BS 6472 sets out the probability of adverse comment from occupants of residential buildings exposed to vibration quantified in terms of the vibration dose value (VDV). These range from a VDV between 0.1 and 0.4 $m/s^{-1.75}$ for *"low probability of adverse comment"* to between 0.2 and 0.8 $m/s^{-1.75}$ where adverse comment is *"possible"*, and finally between 0.4 and 1.6 $m/s^{-1.75}$ where adverse comment is *"probable"*.
- 5.105 Appropriate values for the assessment of magnitude of impact are presented in Table 21 for ground-borne vibration from rail activity affecting residential receptors. The threshold above which levels would result in a low magnitude of impact are based on the lowest values within the *"low probability of adverse comment"* VDV range for daytime and night-time; the level at which a medium magnitude of impact would occur are midway between the *"low"* and *"high"* magnitude of impact thresholds and the level at which a *"high"* magnitude of impact would occur are set at the lowest values within the *"adverse comment probable"* range for daytime and night-time.
- 5.106 Appropriate values for non-residential vibration-sensitive receptors were derived from these values in accordance with the guidance note in BS 6472 which states that *"for offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16h day"*.
- 5.107 The values used to predict a magnitude of impact for ground-borne railway vibration from new or altered lines are shown in Table 21.

Table 21: Magnitude of impact criteria for railway vibration

Sensitivity of receptor	Period ⁽¹⁾	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Bespoke assessment method to be used					
Medium	Day	≤0.2	0.2-0.4	0.4-0.8	>0.8	VDV m/s ^{1.75}
	Night	≤0.1	0.1-0.2	0.2-0.4	>0.4	
Low	Day	≤0.4	0.4-0.8	0.8-1.6	>1.6	
	Night	Night time assessment not normally required				
Very low	Day	≤0.8	0.8-1.6	1.6-3.2	>3.2	
	Night	Night time assessment not normally required				
Note: ⁽¹⁾ – day is 07:00 to 23:00 hours and night is 23:00 to 07:00 hours.						

- 5.108 The criteria set out in Table 21 apply at the point of entry into the human body, i.e. within the affected properties. Where assessments are undertaken at points other than the point of entry to a body, transfer functions between the assessment point and the point of entry should be considered. BS 6472 does not provide any guidance on transfer functions.
- 5.109 BS 6472 does not provide any guidance on predicting, assessing or controlling re-radiated ground-borne noise, nor do any of the other standards referred to in policy statement NPS EN-1. UK Guidance for the measurement and assessment of ground-borne noise is provided in the Association of Noise Consultants (ANC) publication *'Measurement & Assessment of Groundborne Noise & Vibration'* (2012). This provides example criteria for re-radiated ground-borne noise derived from the American Public Transport Association (APTA) and the Federal Transit Administration (FTA) of the US Department of Transportation. Emerging from these, 35dB, L_{Amax} is generally recommended for use as a design guideline; below this, levels would be barely perceptible, according to the FTA advice.
- 5.110 The ANC guidance provides example criteria for different building uses, but broadly indicates that impacts in residential buildings are generally unlikely below a maximum noise level of 35dB L_{Amax} and that higher magnitude impacts occur at or above 45dB L_{Amax} . The FTA's 2006 document, *'Transit Noise and Vibration Impact Assessment'* makes a distinction between frequent, occasional and infrequent events when considering their effects. Frequent events occur more than 70 times per day; occasional occur between 30 and 70 times per day and infrequent events occur less than 30 times per day. Where events are frequent, it suggests using 35dB but where events are infrequent, it suggests using 43dB, L_{Amax} , although it recommends that "... some judgement must be exercised ..." when considering freight trains due to the length of time that these take to pass.
- 5.111 On a precautionary basis, therefore, the lower threshold of 35dB, L_{Amax} has been selected as the LOAEL value for groundborne noise from rail movements at night for this project.
- 5.112 The FTA guidelines recommend considering the spectrum peak when considering the level of ground borne noise which would cause annoyance. They state that, for a vibration spectrum peak near 60Hz (which is the approximate level for rail freight vibration), a level of 50dB, L_{Amax} would represent the:

“Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable in sleeping areas, mid frequency noise annoying in most quiet areas.”

5.113 A level 60dB, L_{Amax} would represent the:

“Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise annoying for sleeping areas, mid-frequency noise annoying even for infrequent events with institutional land uses such as schools and churches.”

5.114 On this basis, for this project, a level of 45dB, L_{Amax} is suitable as a threshold at which a moderate adverse effect may be expected. Since vibration would only occur infrequently and would be low frequency in character, a value of 60dB, L_{Amax} may, in fact, describe a high magnitude of effect. However, since the trains are freight trains and it is recommended that caution be exercised in relation to the frequency of occurrence for these, a precautionary 50dB, L_{Amax} will be used to represent a high magnitude of impact. These values have been therefore been used against which to assess ground borne noise from the five or less rail freight movements at night.

5.115 These levels have been adopted as the criteria values for medium and low sensitivity receptors, as shown in Table 22. A slow time weighting is used, as is customary for the assessment of groundborne noise. For higher sensitivities, a bespoke approach will be taken, based on ANC guidelines.

Table 22: Magnitude of impact from ground borne noise due to railway movements – internal values

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Any	<35	35	45	50	L_{ASmax} , dB
Low	Any	<35	35	45	50	
Very low	Any	Assessment not normally required				

5.116 The LOAEL thresholds are the same as the threshold at which a low effect can begin to be observed, i.e. 35dB, L_{ASmax} , as explained above. The SOAEL has been set at the point at which a high magnitude of effect is predicted to occur, which is, for both medium and low sensitivity receptors, 50dB, L_{ASmax} .

LOAEL and SOAEL values for railway vibration

5.117 The LOAEL and SOAEL values for both railway vibration and groundborne noise are taken from Tables 21 and 22 respectively, with the LOAEL adopting the ‘low’ impact magnitude thresholds and the SOAEL adopting the ‘high’ impact magnitude thresholds.

5.118 The resulting values are shown in Table 23 and 24.

Table 23: LOAEL and SOAEL values (internal) for ground-borne vibration from rail movements

Receptor sensitivity	Period	LOAEL	SOAEL	Parameter
High	Would require site specific criteria			VDV, m/s ^{1.75}
Medium	Day (07:00 to 23:00 hours).	0.2	0.8	
	Night (23:00 to 07:00 hours).	0.1	0.4	
Low	Day (07:00 to 23:00 hours).	0.4	1.6	
Very low	Day (07:00 to 23:00 hours).	0.8	3.2	

Table 24: LOAEL and SOAEL values (internal) for groundborne noise from rail movements

Receptor type	Period	LOAEL	SOAEL	Parameter
Medium	At any time during occupation / use	35	50	L _{ASmax} ,dB
Low		35	50	

Noise from car parks, security areas (other than those at the main development site), park and ride operations, campus activities, freight management facilities, off-site sports facilities, and operational level crossings

- 5.119 NPS EN-1 states that the noise impact from ancillary activities associated with the development must also be considered, although no specific standards are recommended. Road traffic and rail are given as examples, but, in this case, would also apply to noise from car parks and security areas, as well as the two proposed park and ride sites, accommodation campus, freight management facilities, off-site sport facilities, and operational level crossings. These activities are termed ‘general activities’ in this assessment.
- 5.120 Car parks and security areas at the main site are considered along with other noise from the main development site, as discussed above.
- 5.121 Prior to the 2018 publication of the WHO ‘Environmental Noise Guidelines for the European Region’, the WHO ‘Guidelines for Community Noise’ 1999 provided guidance on levels that could be used to predict a community’s reaction to these types of sources. Although the later guidelines state that the 1999 guidelines are largely superseded, they note that some of the earlier guidance remains valid, for example, “for any values not covered by the [WHO 2018] guidelines, such as industrial noise and shopping areas”.
- 5.122 Accordingly, for low and medium sensitivity receptors a low level of effect during the day is considered to occur when the noise is above the level which, according to the 1999 WHO Guidelines, represents a level below which “little or no serious annoyance in the community” is likely to occur: 50dB, L_{Aeq, 16h}.
- 5.123 At night, guidance in NNGE 2009 states:
- “Considering the scientific evidence on the thresholds of night noise exposure indicated by L_{night,outside} as defined in the Environmental Noise Directive (2002/49/EC), an L_{night, outside}

- of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly.”
- 5.124 Accordingly the threshold at which a low level of effect may begin to occur has been selected as 40dB, L_{night} .
- 5.125 Sudden noises at night, such as may occur within car parking areas, when car doors or boots are closed have the potential to result in sleep disturbance. It is not possible to accurately predict noise ingress to receptors from such sounds due to the varying construction specification of dwellings around the AD sites and elsewhere where this may be an issue. Regardless of façade construction, external noise ingress is typically dictated by the sound reduction provided by the windows, vents or other penetrations in the building envelope. Should these windows be partially open, such as for ventilation or cooling, then sound reduction would be inherently limited to approximately 15dB according to BS 8233. When applied to the internal threshold of 45dB L_{Amax} (from WHO 1999 guidelines), this results in an external value of 60dB L_{Amax} as the threshold at which a low level of adverse effect might occur.
- 5.126 During the day time, a medium magnitude impact would occur when the external level exceeds 55dB, $L_{Aeq, 16h}$. According to BS 8233, this represents, “an upper guideline value ... which would be acceptable in noisier environments.”
- 5.127 BS 8233 also advises that “where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.” On this basis, levels which are more than 5dB above the threshold of a low effect may be considered to result in a moderate adverse effect for both the L_{night} and L_{Amax} parameters.
- 5.128 A high magnitude of impact would occur when a closed window providing sound reduction of 25dB would not result in acceptable internal levels. Internal noise levels for day and night, according to guidance within BS 8233 would need to be below 35dB, $L_{Aeq, 16h}$ during the day and 30dB, $L_{Aeq, 8h}$ at night for dwellings. A high magnitude effect would therefore occur at 25dB above these: 60dB, $L_{Aeq, 16h}$ and 55dB, $L_{Aeq, 8h}$. This night-time level coincides with the WHO ‘Night Noise Guidelines for Europe’ (2009) recommended an Interim Target of 55dB L_{night} outside dwellings at night.
- 5.129 Low sensitivity receptors will often not be in use at night and where they are, people would be working so a level which would guard against sleep disturbance would not be appropriate.
- 5.130 A reasonable internal noise level for low sensitivity receptors can be derived from guidance in BS 8233, for the design of noise levels for internal workspaces. This suggests that an open plan office would require levels of 45 to 50dB, $L_{Aeq, T}$ when unoccupied, and for workspaces requiring concentration, the following levels are recommended:
- Library, gallery, museum 40 – 50dB, $L_{Aeq, T}$
 - Staff/meeting room, training room 35 – 45dB, $L_{Aeq, T}$
 - Executive office 35 – 40dB, $L_{Aeq, T}$
- 5.131 From this, a value of 40dB, $L_{Aeq, T}$ can be taken to be a reasonable level for such internal spaces and, since working hours are generally 8 hours per day, the value for T in this case would be 8 hours. On this basis, in order to achieve a level of 40dB, $L_{Aeq, 8h}$ for these spaces

with a closed window providing sound reduction of 25dB, the external level at which a significant change of behaviour would occur would be 65dB, $L_{Aeq, 8h}$. For an open window providing a sound reduction of 15dB, the threshold at which a low level of effect would occur would be 55dB, $L_{Aeq, 8h}$.

5.132 Guidance on sleep disturbance and on provision of sound insulation is relevant for dwellings (or other residential buildings only, which are classified as “medium sensitivity” receptors. Since high sensitivity receptors would be so due to specific and potentially unique circumstances, the assessment of this type of noise source on these receptors will be considered by a bespoke method, relevant to local circumstances. Railway noise is unlikely to have an adverse effect on receptors with very low sensitivity, such as industrial and commercial buildings, and there are no standards which suggest criteria which might be suitable in these circumstances.

5.133 Table 25 below shows the magnitudes of impact for receptors of different sensitivity for car parks, security areas (other than those at the main development site), park and ride operations, campus activities, freight management facilities, off-site sports facilities and operational level crossings. These sources are termed ‘general activities’.

Table 25: Magnitudes of impact for receptors of different sensitivity for noise from general activities, all values are free field

Sensitivity of receptor	Period	Magnitude of impact				Parameter
		Very low	Low	Medium	High	
High	Any	Bespoke assessment method to be used				
Medium	Day	<50	50	55	60	L _{Aeq, 16h} , dB
	Night	<40	40	45	55	L _{Aeq, 8h} , dB
		<60	60	65	70	L _{Amax} , dB
Low	Day or night	<55	55	60	65	L _{Aeq, 8h} , dB
Very low	Any	No assessment normally required				

LOAEL and SOAEL values for general activities

5.134 The LOAEL thresholds are the same as the threshold at which a low effect can begin to be observed, i.e. 50dB, $L_{Aeq, 16h}$ for daytime and 40dB, L_{night} and 60dB, L_{Amax} , at night as explained above.

5.135 The SOAEL has been set at the level above which a closed window providing a sound reduction of 25dB would no longer be sufficient to result in an acceptable internal level. These values would be 25dB above the relevant guideline values from BS 8233 and WHO 1999.

5.136 The resulting LOAEL and SOAEL values are shown in Table 26.

Table 26: LOAEL and SOAEL values for noise from general activities (free-field values)

Time Period	LOAEL	SOAEL
Day (07:00-23:00)	50dB $L_{Aeq, 16h}$	60dB $L_{Aeq, 16h}$
Night (23:00-07:00)	40dB $L_{night, outside}$	55dB $L_{Aeq, 8h}$

6.0 Assessment of Tranquillity using the Natural Tranquillity Method

- 6.1 The impact of the proposed new road on tranquillity has been considered using the Natural Tranquillity Method (NTM) which is a method described in 'Tranquil Spaces', published in 2019. This method reviews previously published approaches to the assessment of tranquillity and concludes that they are not capable of providing a reliable assessment of tranquillity for planning purposes. Probably the best known of these, is the approach published by Campaign to Protect Rural England (CPRE) in 2006, 'Tranquillity Mapping: Developing a Robust Methodology for Planning Support in 2008' is considered in detail and a number of key problems identified if the approach were to be used to carry out an assessment for planning purposes. Tranquil Spaces describes research involving the measurement and recording of sound character and level and simultaneous scoring of tranquillity at thousands of locations around the UK over a four year period and how this led to the derivation of a evidence based method for converting details about the sound level and character into a tranquillity score.
- 6.2 As well as dealing with key the shortcomings of other methods, such as the fact that people's response to road traffic noise is not linear, the fact that the CPRE method uses low resolution 500m by 500m grid sizes so that all tranquillity within each 500m square has the same score and that fact that the presence of natural sound is not properly considered in other methods, the NTM provides a reliable way to assess existing tranquillity and the tranquillity which would be present as a result of proposed changes.
- 6.3 In summary, the NTM involves surveying the area, noting sound character and level, according to a number of defined rules and recording results in terms of four parameters: NAMM, PONS, L_{RR} and L_{AT} (as described below). These parameters enable a record to be made of the relative level and degree of presence of natural sounds and man-made sounds, sounds from transportation sources and the overall level of sound. These parameters and the rules for assessing them are described below.
- 6.4 NAMM is the relative levels of natural and man-made sound recorded according to Table 27 below:

Table 27: NAMM values

NAMM parameter value	Description
1	All or virtually all sound is from man-made sources
2	Sounds are mainly man-made but natural sounds are also present
3	Natural and man-made noise contributes equally
4	Sounds are mainly natural but man-made sounds are also present
5	All or virtually all sound is from natural sources

Note: 'man-made' sounds include noise from items or animals brought to (or near to) the location by people so would, for example, include noise from machinery, dogs, and radios.

- 6.5 PONS is recorded as the percentage of time when you can only hear natural sound. Silence (or absence of man-made and natural sounds, as defined here) is considered a 'natural sound' contributing to the PONS value.
- 6.6 The values assessed for both PONS and NAMM should reflect conditions on a typical busy or quiet day. This presents a problem when survey time at any given location is limited as will often be the case. It is therefore important that the values observed are considered alongside other information about the pattern of noise source occurrence.
- 6.7 The NAMM and PONS indices are complementary; both provide a way of assessing the amount of natural and man-made sound experienced at each survey location. The more time spent making these observations, the more reliable the results. When scoring NAMM and PONS, follow the additional rules set out in Table 28 and estimate the value over a 12-hour day (from 07:00 to 19:00 hours). Atypical events should be excluded from results.

Table 28: NAMM and PONS rules

Rule	Topic / situation	Rule
NP1	Road traffic and rail noise	Other than where rules NP2, NP3 or NP4 below apply, when assessing PONS and NAMM values, noise from road traffic and rail must be disregarded*.
NP2	Road traffic noise continuous** and dominant, defined as: <ul style="list-style-type: none"> • where RTN is greater than or equal to 50dB and • RTN is greater than or equal to (all other sources + 4dB) 	Score NAMM = 1 and PONS = 0
NP3	Road traffic is continuous** and significant, defined as: <ul style="list-style-type: none"> • where RTN is not dominant (defined as in NP2) and • RTN is equal to or between 3dB below the overall measured level and the overall measured level 	Record PONS as 0 and if NAMM would be 5, record NAMM as 4, otherwise record NAMM as normal.
NP4	Rail noise dominant, defined as: <ul style="list-style-type: none"> • where rail noise > 56dB and • (rail noise – 6) > (all other sources + 4) 	Score NAMM = 1 and PONS = 0
NP5	When recording sound from aircraft or boats	For all such events, record using NAMM and PONS.

Rule	Topic / situation	Rule
NP6	Where the overall background noise level is relatively low, distant sounds are more readily audible. In such circumstances, where one can clearly hear a distant man-made sound (such as children playing, dogs barking or aircraft flying over) but where these sounds do not affect the overall L_{AT} by more than 1dB	Record NAMM = 5 and reduce PONS by the amount necessary to account for proportion of time for which the source is present.
NP7	Continuous, low noise level man-made sound (such as a fan or motor in the distance running continuously but which is only noticeable when listening carefully)	Ignore for the purposes of NAMM and PONS and include as part of the L_{RR} .
NP8	Where there is very little man-made or natural sound (such as may be found within a courtyard area)	Record the percentage of time when there is 'silence' (i.e. the absence of sounds other than road traffic or rail noise) as a 'natural sound' within PONS.
NP9	Where man-made sounds are intermittent, sudden sounds but occurring repeatedly such as hammering or dog barking	Whenever a non-natural sound of this type occurs repeatedly in any given minute, then the PONS value for that minute should be 0%.

* Disregarded means treating it as if it does not exist at all. Other than for rules NP2, NP3 and NP4, road traffic (and rail) noise is effectively considered to be inaudible when assessing NAMM and PONS.

** Continuous means present all or virtually all the time. Even busy roads can have brief lulls in traffic flow occasionally; where these occur, the flow may still be considered continuous if it is audible most of the time.

6.8 L_{RR} is the parameter used of the assessment of the contribution of road and rail noise. Ideally, road traffic levels around a site should be predicted using road traffic flow information (number, type and speed of vehicles) and a computer model used to predict noise propagation taking account of local topography, screening, wind conditions based on the prevailing wind for the area in question, ground and air absorption of sound. However, this is not always possible in practice. It is important to assess the contribution of road traffic noise by measurement, either to validate the model or because no modelled values are available. When it is not possible to predict road traffic levels by modelling or calculation, the rules in Table 29 below should be followed.

Table 29: L_{RR} rules

Rule	Situation	Rule
RR1	Road traffic noise levels can be heard clearly without interference from other sounds for much of the time	Measure directly, removing any other sounds from the measurement.
RR2	Road traffic noise levels are fairly steady but can only be heard when other sounds are not present (which may only occur occasionally)	Measure directly with care – noting the road traffic noise level when no other sounds are present.
RR3	Where there is a continuous flow of traffic on a road more than 100 metres away	It is particularly important to model RTN (if possible) for typical conditions, bearing in mind the prevailing wind. If not possible, then measurements must be made with a range of wind conditions and typical levels established with reference to this information.
RR4	Road traffic noise cannot be heard due to masking by other sounds (e.g., in a busy pedestrianised town centre or a park where there are sounds from other sources)	Either use a value which is 10dB below the minimum measured noise or 40dB, whichever is the lower.
RR5	Where road traffic noise is inaudible due to being too far away, very well screened, or due to low flows of vehicles	Use 15dB as value for RTN.
RR6	Where the local road has a low flow of traffic	See ‘Dealing with roads with low vehicle flows and more complex road traffic conditions’ below.
RR7	If the level of road traffic or railway noise is determined (by calculation) to be below 15dB	Record L _{RR} as 15dB.

- 6.9 Rail noise can be predicted by modelling using information about train and wagon types, numbers, speeds and so on. In practice, however, specific data about train and carriage/wagon types may be difficult to access/utilise. Rail noise is therefore often calculated by measuring the level of noise from different train types as the single event level, L_{AE}, at a particular distance, adding up the contribution from each type depending on the number of trains which run in a typical day, then correcting for attenuation with distance and other factors which affect sound propagation, as appropriate to calculate an average level for the period of interest; in this case, generally, a 12-hour day.

- 6.10 To obtain a value for L_{RR} for sites where both road and rail noise is present, the road traffic noise (RTN) should be logarithmically added to the level of rail noise (RN) – 6dB over a 12-hour day between 07:00 and 19:00 hours using formula:

$$L_{RR} = 10 \times \log [10^{(RTN/10)} + 10^{((RN-6)/10)}]$$

Using the L_{RR} parameter for other sound sources

- 6.11 The L_{RR} parameter was designed for assessing the contribution of road and rail noise, but it has been also found to be useful for one additional type of sound source. Occasionally, where there is a continuous, distant man-made sound such as a fan or motor which is only noticeable when listening carefully, this should be logarithmically added to the L_{RR} parameter without the application of any correction.

L_{AT} – the corrected overall measured level

- 6.12 This is derived from the measured L_{Aeq} , which may be modified according to certain rules in certain conditions. The L_{Aeq} should be measured using a type 1 sound level meter, calibrated, with an appropriate wind shield. All measurements should be taken in a free field location at a height of around 1.5 metres above ground. Meteorological conditions should be suitable for the measurement of environmental sound.
- 6.13 The L_{AT} value used will, in general, be an estimate of the L_{Aeq} value which would be measured over a typical 12-hour day at each location. Reliable spot checks will normally suffice and the value to use for L_{AT} will simply be the measured L_{Aeq} , with two exceptions.

Exception 1

- 6.14 When train noise is present, this needs to be removed from the measurement (as explained below) and then added back in. When adding its contribution back into the assessment to obtain the effective 'with train' L_{AT} value, the corrected train noise must be used rather than the actual train noise.

$$L_{AT} = \text{Measured } L_{Aeq} \text{ (without trains)} + (\text{Train level} - 6).$$

The subtraction is arithmetic, but the addition of levels is logarithmic.

Exception 2

- 6.15 If the survey location is within 25 metres of an active playground regularly containing children shouting and screaming, then a 5dB penalty should be added (arithmetically) to the measured L_{Aeq} value to account for the impact of this type of sound. In these circumstances,

$$L_{AT} = \text{Measured } L_{Aeq} + 5\text{dB (arithmetic addition)}.$$

- 6.16 If a location has both an active playground and train noise present, then both corrections would need to be applied, with the playground correction being applied first.

Dealing with roads with low vehicle flows and more complex road traffic conditions

- 6.17 In rural locations, there is often less than one vehicle passing every minute and, although this can mean that the values of L_{RR} (and therefore L_{AT}) can be quite high, the tranquillity score is often still reasonably good since, for much of the time, there are no vehicles present. According to rules NP2 and NP3, if the sound of road traffic is not continuous (not audible for all or virtually all of the day), the NAMM and PONS scores should not be modified. NAMM and PONS only need to be modified to take account of this when vehicle numbers rise to the point where road traffic noise is continuous. For a country road a continuous flow might occur when vehicle numbers rise to approximately 200 – 300 vehicles per hour, for example, although this depends on the road layout and level of other ambient sounds. If other ambient sounds are lower and the stretch of road audible is long, then RTN may be continuously audible with lower flows than this.
- 6.18 Occasionally, one will encounter a more complex situation where there is a local road with low flows and continuous road noise from further away. In this situation, the value of L_{RR} is quite likely to be primarily affected by road traffic on the local low-flow road but the continuous sound of traffic on the more distant road(s) would also need to be considered.
- 6.19 To determine whether to correct the NAMM and PONS scores, one must first consider only the distant continuous road traffic noise, ignoring any noise from the local road. This approach would be important when considering the potential impact that a new road scheme might have on a rural location which may currently experience good or excellent tranquillity, and which could result in a noticeable drop in tranquillity as a result of the scheme.

Predicting tranquillity score using the NTM formulae

- 6.20 This can be done by processing the NAMM, PONS, L_{RR} and L_{AT} scores using the formulae in Appendix A of 'Tranquil Spaces'. This will return the relative probability of each tranquillity score according to the codes in Table 30 and from these select the score which has the highest probability.
- 6.21 The relative probabilities are calculated as follows:

The relative probability, P_1 of the tranquillity score 1 (corresponding to the tranquillity score of 1, described as shown in Table 30 below) is always zero:

$$P_1 = 0.00;$$

... and the relative probability of each other tranquillity score, P_n (where n is a value between 2 and 8, corresponding to the tranquillity scores of 2 to 8, as shown in Table 24) is given by;

$$P_n = A_{an} + A_{bn} \times \text{NAMM} + A_{cn} \times \text{PONS} + A_{dn} \times L_{RR} + A_{en} \times L_{AT}$$

Where

A_{an} , A_{bn} , A_{cn} , A_{dn} and A_{en} are five different numbers (constants) for each value of n , such that there are in total of 35 different constants (five constants per tranquillity score and seven tranquillity scores) in total.

Table 30: Tranquillity scores and descriptions

Tranquillity score	Description
1	Frantic / chaotic / harsh
2	Busy / noisy
3	Unsettled / slightly busy
4	Not quite tranquil
5	Just tranquil
6	Fairly tranquil
7	Good tranquillity
8	Excellent tranquillity
9	Perfect tranquillity

Note: the formulae will never report 'perfect tranquillity'. This would only occur where there are no sounds from boats, aircraft, trains or any other man-made source at all. If this condition were to be found, then the surveyor would be able to simply report it as 'perfect tranquillity' without the need for any processing.

7.0 Glossary of Terms

Term	Definition
Air/Atmospheric Absorption	The excess acoustic attenuation, over and above that caused by distance attenuation, due to the interaction of an acoustic wave with air molecules. Often written A_a .
Ambient Noise	The totally encompassing sound in a given situation at a given time. Most often described in terms of the index L_{AeqT} .
Amplitude (or Level)	The amplitude of a wave is a measure of its point of highest magnitude. The parameter of measurement must be stated when stating an amplitude.
Arithmetic Mean	The sum of a set of values divided by the number of values.
A_{rms}	The root mean squared value of a set of acceleration values measured by a vibration level metre. Typically has the units m/s^2
A-Weighting	A frequency weighting which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Units may be denoted as dB(A) or as sound pressure levels L_{pA} in dB
Background Noise	See L_{A90}
Barrier Attenuation	An obstruction to the 'straight-line' propagation of a sound wave from a sound to a receptor will lead to some attenuation of that sound wave. The obstruction may be an earth mound, a building, or a purpose-built acoustic barrier. Barrier attenuation is greater for high 'pitch' sounds than it is for low pitch sounds. Often written A_b .
Barrier Calculation	A desktop calculation to determine the amount of attenuation caused by a barrier. It takes into account the height of the source, the barrier and the receiver, as well as the distances between them.
Continuous	A continuous sound source is one that emits sound without interruption.
Crest Factor	The crest factor is the peak of a ground vibration amplitude divided by its rms value. It gives an indication of how extreme the peaks are in a waveform. A crest factor of 4 to 5 is typical for a freight train.
Decibel (dB)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is $20 \mu Pa$, the threshold of normal hearing is in the region of 0dB, and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions. A change of 3dB(A) is the minimum perceptible under

	normal conditions, and a change of 10dB(A) corresponds roughly to halving or doubling the loudness of a sound.
Dominant Frequency	The frequency at which the highest amplitude of a parameter is measured during a measurement interval.
Façade Noise Level	The sound level adjacent to the façade of a building, usually at a distance of 1 metre.
Fast Time Weighting	Corresponds to 125ms time constant, meaning that a SLM will record sound levels at 125ms intervals when set to fast time weighting. This means that a SLM will respond more sensitively to impulsive sounds.
Field Calibration	<p>A field calibration is undertaken prior to a sound level measurement using an acoustic calibrator to check that the sound level meter is accurately measuring sound levels. The field calibration is checked upon completion of a measurement, or series of measurements, and if the field calibration varies by ± 0.5dB or more, the measurements are generally discarded.</p> <p>An acoustic calibrator generates a single frequency one at a known and calibrated level.</p> <p>Acoustic calibrators and sound level meters are periodically checked and re-calibrated at a laboratory, typically every two years for a sound level meter and every year for an acoustic calibrator.</p>
Free-field noise level	The sound level away from the façade of a building or other structure, so as to be in a sound field, free of reflections other than from the ground. Typically taken to be at least 3.5m from any reflecting structure, other than the ground.
Frequency (or Pitch)	The rate per second of a vibration constituting a wave; vibration of air molecules in the case of sound, or vibration of molecules in a solid in ground bourn vibration. A higher frequency of sound waves corresponds to a higher pitch of sound.
Frequency Band	The whole frequency range is divided into sets of frequencies called bands. Each band covers a range of frequencies.
Ground borne Noise	Sound that arises in an enclosed space that has arrived from vibration through the ground, as opposed to through the air.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. Frequency is related to the pitch of a sound.
Impulsive	An impulsive sound source is characterised by fast onset times, which might be described as a 'sudden appearance' Traditionally thought of as 'bangs' or 'thumps', BS 4142: 2014+A1: 2019 takes a wider view of impulsiveness, where only the onset of the sound is considered and the sound need not be of a short duration.

Intermittent	An intermittent sound is one that occurs sporadically and has distinct on/off characteristics.
$L_{A10,T}$	The A weighted level of noise exceeded for 10% of the specified measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic. $L_{A10,18hr}$ is the arithmetic average of the 18 hourly $L_{A10,1hr}$ values from 06:00 to 24:00 hours.
$L_{A90,T}$	The A weighted noise level exceeded for 90% of the specified time period, T. In BS 4142: 2014+A1: 2019 it is used to define background noise level.
$L_{Aeq,T}$	The equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T. This period is taken to be 16 hours (07:00 to 23:00 hours) and 8 hours (23:00 to 07:00 hours) to describe day and night.
L_{Amax}	The highest A-weighted noise level recorded during a noise event. The time weighting used (F or S) should be stated.
L_{Ar}	The rating level as described by BS 4142: 2014+A1:2019. This is the average ($L_{Aeq,t}$) value, after correction has been applied for any tonal, impulsive, intermittent distinctive character.
L_{AT}	Parameter used by Natural Tranquillity Method to assess the effect of the level of sound on the tranquillity score.
L_{den}	The average sound level over a day-long period of 12 hours can be described as $L_{Aeq, 12\text{ hrs}}$ or L_d . For the evening period, the equivalent would be $L_{Aeq, 4\text{ hrs}}$ or L_e . At night, L_n would otherwise be $L_{Aeq, 8\text{ hrs}}$. The L_{den} is the combination of these averages, with factors of +5dB applied to the evening value and +10dB applied for the night time period. For example, if $L_d = 50\text{dB}$, $L_e = 50\text{dB}$ and $L_n = 50\text{dB}$, L_{den} would be the average of $50\text{dB}_{12\text{ hrs}}$, $55\text{dB}_{4\text{ hrs}}$, and $60\text{dB}_{8\text{ hrs}}$ = $56\text{dB}_{24\text{ hrs}}$
Line Source	As opposed to a point source, a line source is one which emits energy from a one dimensional geometry. A line source will always have one dimension which is significantly larger than the other two. An example of a line source is a road. A train is a moving line source.
L_{night}	Equivalent outdoor sound pressure level associated with a particular type of noise source during night-time (at least 8 hours), calculated over a period of a year.
Log Average	The average of a set of values given using a logarithmic unit. For two values given in dB, this is given by the following formula:

	$C = 10 \log \left(\frac{10^{\frac{A}{10}} + 10^{\frac{B}{10}}}{2} \right)$ <p>For example, the average of 50dB and 60dB is 57dB.</p>
Log Sum	<p>The sum of two values which are given using a logarithmic unit. In the case of a decibel, two identical values combine to give a 3dB increase. Given by the formula:</p> $C = 10 \log(10^{\frac{A}{10}} + 10^{\frac{B}{10}})$ <p>For example, the sum of 50dB and 50dB is 53dB).</p>
Logarithm	The inverse function of raising a number to a power. Logarithms to the base 10 (\log_{10}) are often used when considering calculations which include decibels.
Lowest Observed Adverse Effect Level - LOAEL	This is the level above which adverse effects on health and quality of life can be detected.
L_{RR}	Parameter used by Natural Tranquillity Method to assess the contribution of road and rail noise to the tranquillity score.
Meteorological Effects	As sound passes through the air, it experiences changes in air pressure, density, humidity, temperature and sheer. The latter two normally have the most influence. They can lead to sounds 'upwind' of a source being 10dB lower than for a calm air condition, and around 2dB higher for downwind. Most computer models feature an assumed 'downwind' effect, typically amounting to +2dB. Often written A_{met} .
NAMM	Parameter used by Natural Tranquillity Method to assess the relative balance between natural and man-made sounds.
Natural Tranquillity Method	Method used to assess how tranquil a location is, based on the character and level of sounds present.
Octave Band	A band is said to be an octave in width when the highest frequency in the band is twice that of the lowest frequency in the band. Typically on a SLM these range from the lowest band of 63Hz, to the highest of 8000Hz.
On-time	The percentage of the assessment time period that a particular source is operating ('on'). For example, a generator may run for 8 hours. The on-time, relative to a 16 hour day, would be 50%. On-time corrections are used to illustrate 16-hour day $L_{Aeq, T}$ values.
Peak Particle Velocity (PPV)	Used to quantify the vibration. Usually measured in mm/s, it gives the peak velocity of the surface particles in the ground.
Peak Velocity	The highest velocity attained during the cycle of vibration. For example, for a ball bouncing on a spring, the peak velocity would

	be at the midpoint between the upper and lower stop points. (The average velocity, by reason of its peak being in the positive and then negative direction, would be zero).
Point Source	A source which consists of a single, identifiable, localised object. Typically equal (or close to) in dimension in all three axes.
PONS	Parameter used by Natural Tranquillity Method to assess the percentage of time when one can only hear natural sounds.
Rating Level	The “specific noise level” plus any adjustment for the characteristic features of the noise, used in a BS 4142: 2014+A1: 2019 assessment. Written as $L_{Ar,Tr}$
RMS (Root Mean Squared)	Defined as the square root of the arithmetic mean of the squares of a set of numbers.
Significant Observed Adverse Effect Level SOAEL	This is the level above which significant adverse effects on health and quality of life occur.
Slow Time Weighting	Corresponds to a 1 second time constant, meaning that a sound level meter will measure sound levels every second when set to slow time weighting. This generally smooths out noise measurements giving more of an indication of average noise levels in an environment where the sound level is constantly changing.
‘Soft’ Ground Attenuation	When sound propagates over ground, reflections occur close to the ground. If the ground is acoustically ‘soft’, such as open grassland, the reflected waves are slightly out-of-step with those propagating above ground level. When they combine at the receptor point, a degree of wave cancellation takes place. This leads to an apparent attenuation, and is termed ‘soft’ ground attenuation effect. Typically, this amounts to 3dB over a distance of 100m. Often written A_g .
Sound Level Meter (SLM)	A device used for acoustic measurements which is capable of measuring the level of a sound using a microphone and giving this level in the form of different parameters.
Sound Level Meter Time Weighting	Time weightings are defined by design standards for sound level meter. They define how quickly a SLM responds to a change in noise levels. They are based on the time constant to which the meter measures sound.
Sound Power Level (L_w)	A source of sound, such as a diesel generator, has a quantifiable amount of acoustic energy/power. This is largely (but not totally) independent of where it is located. Knowing the acoustic power enables the sound pressure level to be predicted for various locations. The sound power level is written L_w , denoting a reference to acoustic power in Watts. The reference baseline power value is 1 picoWatt (10^{-12}). So, a source have acoustic

	power amounting to 1 Watt, would have a sound power level of 120dB.
Sound Pressure Level (L_p)	<p>The air pressure fluctuation in a passing sound wave can be expressed in decibels, where the reference (baseline) sound pressure approximates to the threshold of hearing (20 micropascals). For example an rms pressure fluctuation of 1 Pascal (1 N/m²) would be.</p> $L_p = 20 \log \left(\frac{1}{20 \times 10^{-6}} \right) = 94 \text{ dB}$ <p>A reference/baseline value is used with a logarithmic scale to help make the human perception range manageable in its description and presentation. Selecting a reference/baseline of 20 micropascals is akin to selecting the freezing point of water as 'zero' on the Celsius temperature scale.</p>
Third-Octave Band	A third octave band is 1/3 the width of an octave band and allows more detailed analysis of the frequency spectrum.
Tranquillity Score	This is the output from the Natural Tranquillity Method. It is a score between 1 and 9 which provides indicates how tranquil (or untranquil) a location is, with lower values being less tranquil and higher values indicating increasingly tranquil locations.
Transfer Function	The term given to quantify the reduction/energy loss between the amplitude of vibration in the ground and that in the building foundation. Also known as 'coupling loss'.
Vibration Dose Value (VDV)	Vibration index based on acceleration (m/s ^{1.75}) used for considering the effects of vibration within buildings on people. As defined in BS 6472-1: 2008.
Vibration Level Meter (VLM)	A device used for vibration measurements which is capable of measuring the level of a vibration using an accelerometer and giving this level in the form of different parameters.
Vibration Velocity Level (L_v)	<p>Vibration fluctuations can be expressed in terms of decibels, just as they are for sound pressure in the air. The reference (baseline) value for vibration is 10⁻⁹ m/s (or 1 nm/s). For example an rms velocity amplitude of 0.3mm/s would be denoted as follows:</p> $L_v = 20 \log \left(\frac{0.3 \times 10^{-3}}{1 \times 10^{-9}} \right) = 110 \text{ dB}$
V_{rms}	In order to describe a value for velocity which is not simply the peak or the average, the rms value is used. One can liken this to voltage in the home, which cycles (alternates). The value of 230V is the rms value of the voltage, the average value of which would

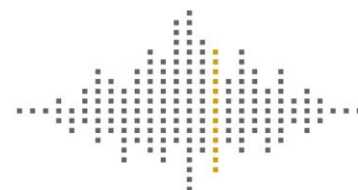
	otherwise be zero because it has a positive and negative direction.
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VOLUME 1, CHAPTER 6, APPENDIX 6G, ANNEX 6G.2: PREDICTION
METHOD FOR VIBRATION AND GROUNDBORNE NOISE

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

Sizewell C Project

Volume 1, Appendix 6G,
Annex 6G.2

Prediction Method for
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Noise

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1.0 Introduction

1.1 Vibration is assessed for all construction work against peak particle velocities (PPV) and for operational rail using vibration dose values (VDV). Groundborne noise is considered only for rail movements using an L_{Amax} , slow time weighting. Criteria and explanations for how these were derived are provided in Annex 6G.1.

1.2 This note sets out, for each of these elements:

- Source levels for key plant and activities with an explanation of how these were derived;
- Details of how vibrational energy decay with distance and transmission into buildings has been calculated, including assumptions used, where site specific information is not known; and
- Graphs showing decay with distance for different sources.

2.0 Source levels

- 2.1 Table 1 below shows a summary of key construction plant vibration levels at a reference distance of 10m.

Table 1: Key construction plant vibration levels at a reference distance of 10m

Plant / Activity	Level, mm/s, PPV	Data source
Earth moving plant: worst case - Bulldozer.	1.3	TRL 429 (Ref 1)
Breaker / crusher	1.5	
Small, twin drum vibratory roller	1.4	
Single drum vibratory roller / compactor	8	
End driven case piling	7.3	BS 5228-2, Section D (Ref 2)
Sheet piling	10	TRL 429 (Ref 1)
Tamping / wacker plate	2.3	

- 2.2 Source data for railway vibration from freight trains travelling at low speeds is very limited. The data which exists does not contain enough information to enable a reliable comparison to be made with the types of trains, flow rates and conditions for this project.

Sharps Redmore has therefore carried out trackside measurements of vibration levels to establish PPV levels from slower moving trains. Survey work was carried out at two locations to measure vibration from trains moving at speeds of between 9 and 30 mph. Corrections have been made for distance and to account for ground conditions and levels of 1.6mm/s and 2.2mm/s PPV have been arrived at as representative values at speeds of 10 and 20mph respectively. The crest factor determined from measurements was estimated to be 5; this value is within the range referred to in the ANC Guidelines "Measurement and Assessment of Groundborne Noise and Vibration" (Ref 3). Frequency spectra were analysed and the dominant frequency was found to be at around 60Hz.

3.0 Decay with distance and transmission into buildings

- 3.1 Vibrational energy is transferred from rail movements into and through the ground, with propagation being affected by distance and damping losses, which depend on the type of ground. It then transfers into building foundations and may be experienced as vibration through the internal floor and is re-radiated into a room as airborne sound.

Decay with distance

The propagation of vibration through ground, induced by plant, piling or rail vehicles has been modelled using the following formula:

$$A_{r1} = A_{r0} (r_1/r_0)^{-n} \cdot e^{(-\alpha \Delta r)}$$

Where:

A_{r1} = amplitude of vibration at distance r_1

A_{r0} = amplitude of vibration at reference distance r_0

r_1 = distance from source to receptor (m)

r_0 = reference distance at which source level was taken (m)

n = decay rate (which is 0.5 for construction sources and 0.3 for railway vibration, from Thompson, "Railway Noise and Vibration" 2009, Ref 4)

α = ground wave friction / damping loss per metre (taken as 0.03/m for East Suffolk for sandy type soils, from New Zealand Transport Agency Research Report 485: 2012, "Ground Vibration from Road Construction", Ref 5)

Δr = distance $r_1 - r_0$.

Transmission into buildings

The transmission of vibrational energy from the ground into a structure such as a building foundation is reduced by the different stiffness and mass of the foundation as compared to the ground. This can be accounted for using a transfer function which is a value which can be applied to the "in ground" vibration levels to predict the value within a building foundation. Where 55% of the vibrational energy is transferred to a building foundation, a transfer function would be 0.55 (which equates to 5 dB) and this is a value which is commonly used for small dwellings. (From the FTA "Transit Noise and Vibration Impact Assessment", Ref 6). For larger buildings the loss would be greater.

Peak particle velocities may be converted to vibration level (L_v) as a dB value using the formula below. The PPV is converted to a root mean squared (rms) value, using a crest factor of 5. This is calculated using the formula below:

$$L_v = 20 \log ((PPV/5)/10^{-9})dB$$

Where:

$L_{v (ground)}$ = vibrational velocity v_{rms} expressed as decibels in the ground.

Ground borne noise

The $L_{v (ground)}$ is reduced as it enters the dwelling foundation to a value of typically 55% (transfer function 0.55) which equates to approximately 5 dB as level. A room correction of -27 dB is then normally applied (from ANC Guidelines, Ref. 3) to convert the vibration in the slab to sound energy in a room. A ground floor slab is not an efficient radiator of low frequencies such as those produced by rail movements (which generates a vibration spectrum with the greatest energy centred around 60Hz). Accordingly, a further 5 dB reduction accounts for this low efficiency of radiation for low frequencies (from the ANC Guidelines, Ref 3). Finally, in order to express the level as an A-weighted value, an A weighting correction of -26 dB must be made (which is the weighting for 63Hz). The formula for calculating the internal sound pressure level from vibration produced by rail movements transmitted into an internal room is therefore:

$$L_{pA} = L_{v (ground)} - 5 - 27 - 5 - 26dB$$

Graphs showing decay of vibration and ground borne noise for various sources with distance

Figures 1 to 4 below show predicted levels at receptors at various distances from vibration sources, based on the approaches and formulae set out above.

Figure 1: Construction sources 1 – lower vibration levels

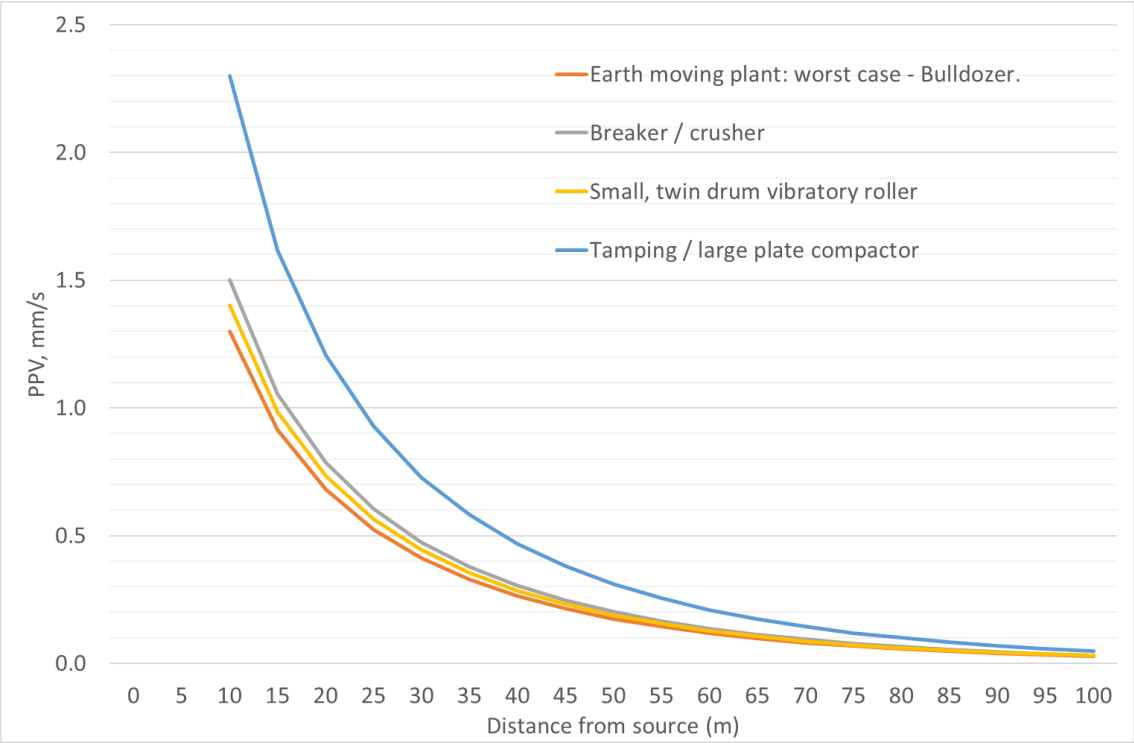


Figure 2: Construction sources 2 – higher vibration levels

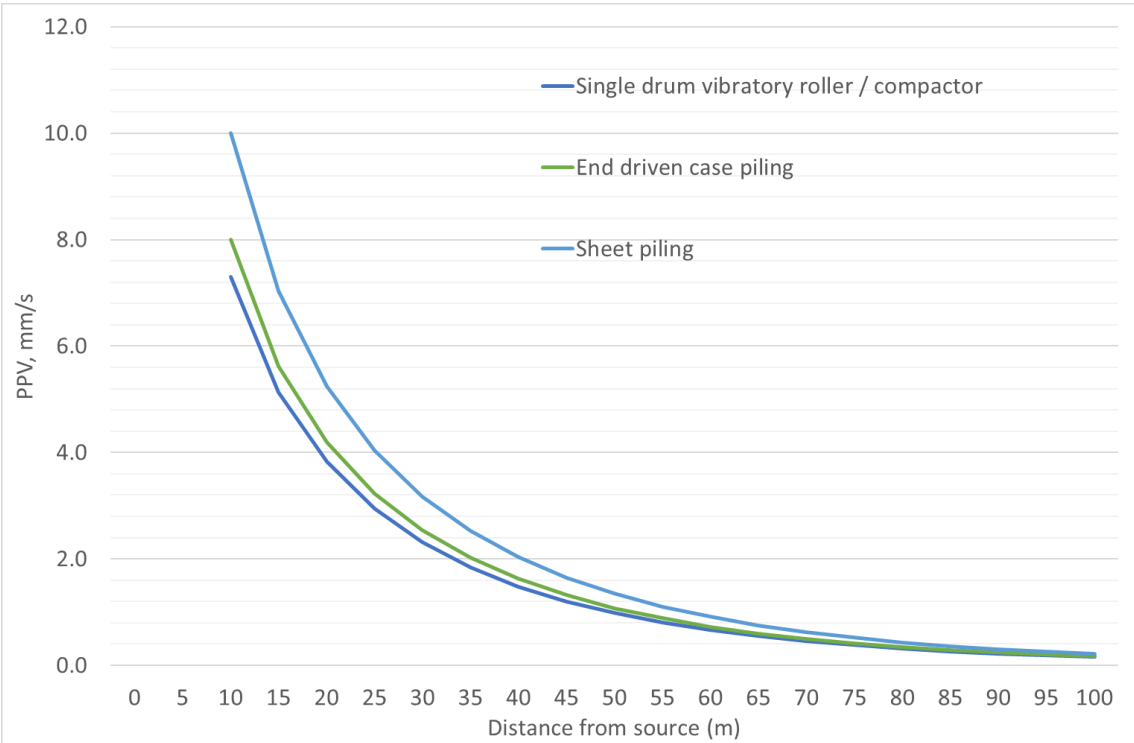


Figure 3: Rail vibration

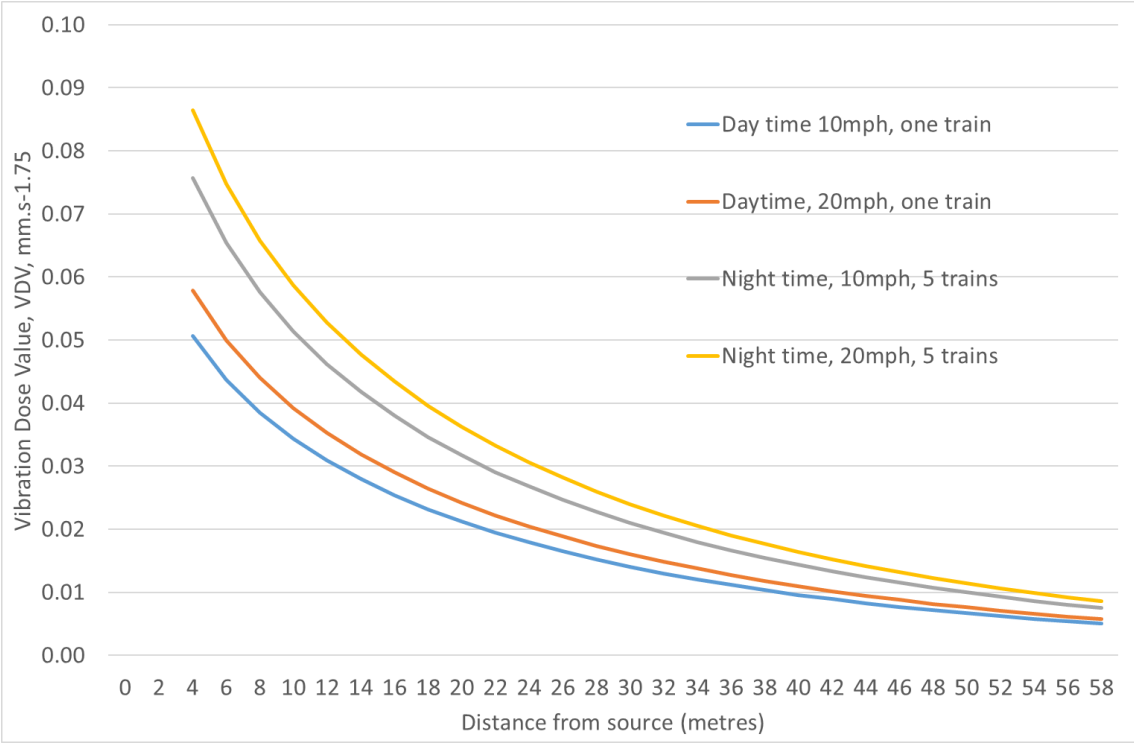
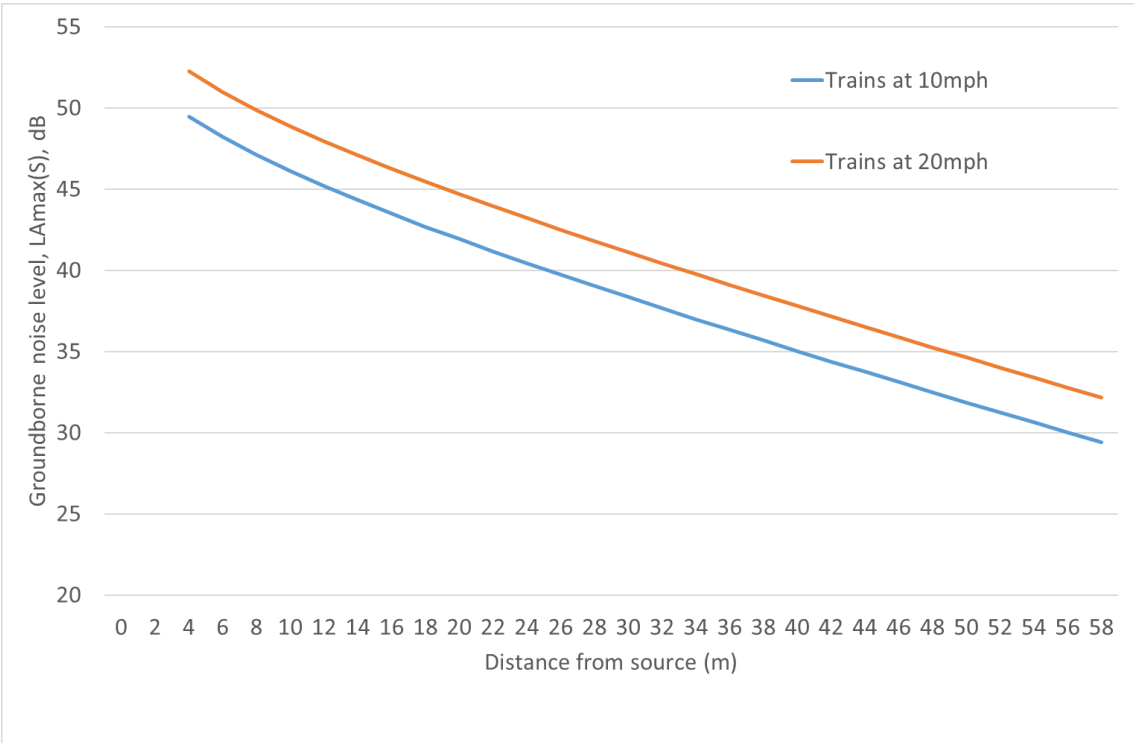


Figure 4: Groundborne noise from rail movements



References:

- Ref 1: Research Report TRL 429: 'Groundborne vibration caused by mechanical construction works'
- Ref 2: BS 5228: 2009+A1: 2014 'Code of practice for noise and vibration control on construction and open sites', Part 2: Vibration
- Ref 3: ANC Guidelines 'Measurement and Assessment of Groundborne Noise and Vibration', 2012
- Ref 4: Thompson, 'Railway Noise and Vibration' 2009
- Ref 5: New Zealand Transport Agency Research Report 485, 'Ground Vibration from Road Construction', 2012
- Ref 6: 'Transit Noise and Vibration Impact Assessment', 2006 Federal Transit Administration (FTA) of the US Department of Transportation



VOLUME 1, CHAPTER 6, APPENDIX 6H: AIR QUALITY LEGISLATION AND METHODOLOGY

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None provided.

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1 Air Quality Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant air quality effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites, unless otherwise indicated in the topic chapters of the site assessment volumes. For example, **Volumes 2 to 9** of the **Environmental Statement (ES)**. Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in the following **ES** chapters and documents submitted with the application for development consent:

- **Volume 2, Chapter 12** (Doc Ref. 6.3);
- **Volumes 3 to 9** (Doc Ref. 6.4-10), **Chapter 5**; and
- **Shadow Habitats Regulations Assessment Report** (Doc Ref. 5.10).

1.1.3 The methodology in this appendix is also used to quantify the magnitude of air quality impacts at ecological receptors with statutory designation, the significance of which is assessed in the ecology and ornithology assessments in **Volumes 2 to 9** of the **ES**.

1.1.4 The **Transport Emissions Assessment**, provided in **Volume 2, Appendix 12B** underpins the assessment of air quality effects from road and rail emissions associated with the Sizewell C Project as a whole and is referenced within the relevant chapters. The modelling and assessment uses forecast road traffic activity levels from the **Transport Assessment (TA)** (Doc Ref. 8.5)

1.1.5 The assessment of air quality effects from construction of the Sizewell C Project has defined the mitigation measures for control of air quality impacts within the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11) which is submitted as a standalone document with the application for development consent.

1.1.6 The assessment of air quality effects from combustion activities proposed during the construction and operation of the proposed development has informed the design and the embedded mitigation measures, including the

stack height for the diesel generators, as described in the descriptions of development in **Volume 2 Chapters 2, 3 and 4** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant air quality effects associated with the proposed development.

1.2.2 Legislation and policy have been considered on an international, national, regional and local level. The following is considered to be relevant to the air quality assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 International legislation relevant to the air quality assessment includes the European Ambient Air Quality Directive 2008 (2008/50/EC) (Ref. 1.1) which sets legally binding limits for concentrations of major air pollutants in outdoor air that can affect public health and the 2004 Fourth Air Quality Daughter Directive (2004/107/EC) (Ref. 1.2) which sets targets for levels of certain toxic pollutants, such as heavy metals, in outdoor air.

1.2.4 The Industrial Emissions Directive (2010/75/EU) (IED) (Ref. 1.3) incorporates and updates the original Large Combustion Plant Directive, and regulates pollutant emissions from the combustion of fuels in plants with a rated thermal input greater than 50MWth.

1.2.5 The Medium Combustion Plant Directive (2015/2193) (Ref. 1.4) regulates pollutant emissions into the air from the combustion of fuels in plants with a rated thermal input equal to or greater than 1MWth and less than 50MWth.

b) National

i. Legislation

Air quality legislation

1.2.6 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations 2010 (Ref. 1.5) which transposes the requirements of the European Ambient Air Quality Directive and the Fourth Air Quality Daughter Directive. The regulations set air quality limits for a number of major

air pollutants that have the potential to impact public health, such as nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}).

- 1.2.7 As required by the Environment Act 1995 (Ref. 1.6), the UK Government has produced a National Air Quality Strategy (Ref. 1.7), which contains air quality objectives and timescales to meet the objectives. At this time the Clean Air Strategy 2019 (Ref. 1.8) sets out frameworks for delivering the air quality objectives in England but does not introduce any objectives that replace those set out in the 2007 National Air Quality Strategy.
- 1.2.8 In addition to the above critical levels set in the legislation, there are non-legislative limits (critical loads) that have been derived for different habitats and relate to the deposition of nitrogen and acidifying species. Critical loads are defined as “*a quantitative estimate of exposure to one or more pollutant below which significant harmful effects on specified elements of the environment do not occur according to present knowledge*” (Ref. 1.9). These are discussed further in **section 1.3** of this appendix and habitat-specific critical loads are presented in **Volume 2, Appendices 12A and 12B** of the **ES**.
- 1.2.9 The Environmental Protection Act 1990 (Ref. 1.10) obliges local authorities to investigate complaints about issues that could be a statutory nuisance under the Act, including smoke, odour or deposition of dust. If a statutory nuisance is identified the local authority must serve an abatement notice on the person(s) responsible.
- 1.2.10 At present, there is no statutory UK or EU standard relating to the assessment or control of dust. ‘Dust’ is defined in British Standard 6069-2:1994 (Ref. 1.11) as particulate matter in the size range 1µm-75µm (microns) in diameter, and is primarily composed of mineral materials and soil particles. The emphasis for the control of construction dust is on the adoption of Best Practicable Means for working on-site.

Environmental Permitting Regulations

- 1.2.11 The Environmental Permitting (England and Wales) Regulations 2016 (Ref. 1.12) apply to all new installations and transpose the requirements of the IED and the Medium Combustion Plant Directive into UK legislation. Under the Environmental Permitting Regulations, the operator of an installation covered by the IED or Medium Combustion Plant Directive must ensure that Emissions Limit Values are met for the defined activities. The operator of an installation covered by the IED is also required to employ Best Available Techniques for the prevention or minimisation of emissions to the environment, to ensure a high level of protection of the environment as a

whole. The emission limits defined within the Environmental Permitting Regulations are detailed within the relevant chapters, **Volumes 2 to 9** of the **ES**.

ii. National Policy Statements

- 1.2.12** The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.13) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.14). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.13** The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Sizewell C Development Consent Order. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.14** A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the national policy statements

Ref	NPS Topic Requirement	How the Requirement has been Addressed
EN-1 paragraph 5.2.4.	<i>"Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements".</i>	Stack height evaluation for the emergency power generation plant that would serve the nuclear power station has been made and is described in Volume 2, Appendix 12C .
EN-1 paragraph 5.2.6.	<i>'Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES).'</i>	The air quality effects of the proposed development are assessed in Volume 2, Chapter 12 , and Chapter 5 of each of Volumes 3 to 10 of the ES (Doc Ref. 6.4-11).
EN-1 paragraph 5.2.7.	<i>'The ES should describe: any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant</i>	The significance of air quality effects for the construction phase and operational phase of the proposed development are presented Chapter 12 of Volume 2 , and Chapter 5 of Volumes 3 to 9 of the ES . The assessment of air quality considers the existing baseline levels of pollutants,

Ref	NPS Topic Requirement	How the Requirement has been Addressed
	<p><i>emissions from any road traffic generated by the project;</i></p> <p><i>the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;</i></p> <p><i>existing air quality levels and the relative change in air quality from existing levels; and</i></p> <p><i>any potential eutrophication impacts.'</i></p>	<p>the absolute emission levels and the relative change in air quality resulting from the proposed development.</p> <p>Significant air emissions are identified together with mitigation and residual effects.</p> <p>Road traffic emissions are considered for the construction and operation of the proposed development.</p> <p>The assessment considers the air quality effects of the removal of temporary facilities and reinstatement of land, within the construction phase.</p> <p>Eutrophication impacts are considered for sites of nature conservation interest (i.e. international, European and nationally designated ecosystem sites) within the agreed study area and are presented in Chapter 12 of Volume 2, and Chapter 5 of Volumes 3 to 9 of the ES.</p>
EN-1 paragraph 5.6.4-5.6.6.	<p><i>'The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke and artificial light to have a detrimental impact on amenity, as part of the Environmental Statement.</i></p> <p><i>In particular, the assessment provided by the applicant should describe:</i></p> <ul style="list-style-type: none"> <i>the type, quantity and timing of emissions;</i> <i>aspects of the development which may give rise to emissions;</i> <i>premises or locations that may be affected by the emissions;</i> <i>effects of the emission on identified premises or locations; and</i> <i>measures to be employed in preventing or mitigating the emissions.</i> <p><i>The applicant is advised to consult the relevant local planning authority and, where appropriate, the EA about the scope and methodology of the assessment.'</i></p>	<p>The potential for emissions of dust from the construction phase of the proposed development (including removal of temporary facilities and reinstatement of the land) are presented in Chapter 12 of Volume 2, and Chapter 5 of Volumes 3 to 9 of the ES. The assessment of dust emissions considers the risk of emissions based on the nature and magnitude of construction activities, the proximity to receptors and their sensitivity, existing baseline levels of dust and the mitigation measures required to limit residual effects to be not significant.</p> <p>The proposed development would not give rise to emissions of odour, steam or smoke or have the potential for insect infestation during any aspect of development that could have a detrimental impact on amenity. Further consideration of these is presented in the Statement of Statutory Nuisance (Doc Ref. 5.12).</p>

Ref	NPS Topic Requirement	How the Requirement has been Addressed
Appraisal of sustainability (AoS): site report for Sizewell paragraph 5.5.	<i>'The construction of a nuclear power station at Sizewell is likely to have localised adverse effects on air quality in the short term (5-6 years), including dust and emissions from construction vehicles, Heavy Goods Vehicles (HGVs), and traffic movements generated by the estimated construction workforce of 4,000. This has the potential to affect residential properties in the surrounding area and villages.'</i>	The assessments consider the potential impacts for the duration of the construction of Sizewell C, including the assessment of dust and other emissions such as non-road mobile machinery (NRMM) emissions from the construction sites, and also emissions from construction related traffic at representative year in the programme including 2023 (early years peak) and 2028 (peak year) of construction the early years peak. This includes the assessment of impacts on residential properties in the surrounding area, and it also assesses the benefits to existing roads where new roads bypass villages.
AoS paragraph 5.6.	<i>'During operation, the traffic generated by the operational workforce has the potential to create longer-term adverse effects on air quality. Traffic and air quality assessments should be undertaken as part of the detailed EIA process, and likely mitigations may include highway improvements, traffic and construction management plans and the use of rail and port facilities where possible.'</i>	An air quality assessment of the operational traffic is presented in Volume 2, Chapter 12 , no further highway improvements are proposed once Sizewell C is operational.
AoS paragraph 5.7.	<i>'Whilst important at a local level, impacts on air quality arising from construction and increased traffic movements during operation and decommissioning are not considered to be of strategic significance. There is a small risk that increased concentrations of airborne pollutants or nutrients could have an adverse effect on adjacent sites of nature conservation interest.'</i>	The potential for adverse air quality impacts on ecological habitats and sites if nature conservation interest are considered and assessed in the terrestrial ecology and ornithology assessments, as relevant for each volume.

iii. National Planning Policy Framework 2019

- 1.2.15 The National Planning Policy Framework (NPPF) (Ref.1.15) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.16 Paragraph 170 of the NPPF states that: *“Planning policies and decisions should contribute to and enhance the natural and local environment by... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability...”*

1.2.17 The effect of the proposed development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities (for this development this means the planning inspectorate), when making decisions for individual planning applications. Paragraph 181 of the NPPF states that: *“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas... Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”*

iv. [Planning Practice Guidance \(Ref. 1.16\)](#)

1.2.18 The National Planning Practice Guidance, (Ref. 1.16) launched on 6 March 2014. It was updated on 1 November 2019, and provides a web-based guidance resource in support of the NPPF (Ref. 1.15). It provides a summary of the air quality issues set out in the NPPF and goes on to note that assessments of the impact of a proposed development on air quality should include the following information:

- the existing air quality in the study area (existing baseline);
- the future air quality without the development in place (future baseline); and
- the future air quality with the development in place (with mitigation).

1.2.19 The Planning Practice Guidance then advises that a planning application should proceed to decision with appropriate planning conditions or planning obligations, if the proposals (including mitigation) would not lead to an unacceptable risk from air pollution and prevent sustained compliance with EU limit values.

v. [Government’s 25 Year Environment Plan \(Ref. 1.17\)](#)

1.2.20 The Government’s 25 Year Environment Plan, published in January 2018, includes strategies to protect and improve the environment, including through

“Increasing resource efficiency and reducing pollution and waste”; this builds on existing strategies and sets out non-binding targets for air pollutant reduction.

vi. National Air Quality Strategy

- 1.2.21** The objectives set out in the National Air Quality Strategy (Ref. 1.7) apply to outdoor locations where people are regularly present and do not apply to occupational, indoor or in-vehicle exposure. It requires local authorities to undertake an assessment of local air quality to establish whether the objectives are being achieved, and to designate air quality management areas (AQMA) if improvements are necessary to meet the objectives. Where an AQMA has been designated, the local authority must draw up an air quality action plan describing the measures that will be put in place to assist in achieving the objectives. Defra has responsibility for coordinating assessments and air quality action plans for the UK as a whole.
- 1.2.22** The current air quality objectives and assessment criteria applicable to the protection of human health and/or local air quality management that are relevant to this assessment are presented in **Table 1.2**. Concentrations are expressed in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$), unless otherwise stated.
- 1.2.23** For the protection of vegetation and ecosystems, a number of critical levels have been developed; critical levels are defined as “*concentrations of pollutants in the atmosphere above which direct adverse effects on...plants [and] ecosystems...may occur according to present knowledge*” (Ref. 1.18). The critical levels applicable to this assessment are shown in **Table 1.2**.

Table 1.2: Air quality standards applied in the assessment

Substance	Air Quality Standard Value ($\mu\text{g}/\text{m}^3$)	Averaging Period	Reference
(NO ₂).	200	99.8 th percentile of 1-hour mean values. ^b	Air quality objective (Ref. 1.7).
	40	Annual mean. ^b	Air quality objective (Ref. 1.7).
Oxides of nitrogen (as NO _x).	75	Daily mean. ^a	Air quality objective (Ref. 1.7).
	30	Annual mean. ^a	Critical level (Ref. 1.5).
Carbon monoxide (CO).	30,000	1-hour mean. ^a	Air quality objective (Ref. 1.7).

Substance	Air Quality Standard Value ($\mu\text{g}/\text{m}^3$)	Averaging Period	Reference
Sulphur dioxide (SO_2).	266	99.9 th percentile of 15-minute mean values. ^b	Air quality objective (Ref. 1.7).
	350	99.7 th percentile of 1-hour mean values. ^b	Air quality objective (Ref. 1.7).
	125	99.2 nd percentile of 24-hour mean values. ^b	Air quality objective (Ref. 1.7).
	20	Annual mean (higher plants). ^a	Critical level (Ref. 1.5).
	10	Annual mean (Lichens & bryophytes). ^a	Critical level (Ref. 1.5).
PM ₁₀ .	50	90.4 th percentile of 24-hour means. ^b	Air quality objective (Ref. 1.7).
	40	Annual mean. ^b	Air quality objective (Ref. 1.7).
PM _{2.5} .	25	Annual mean. ^b	Air quality objective (Ref. 1.7).

Notes: (a) for the protection of vegetation and ecosystems. (b) for the protection of human health

vii. UK Marine Policy Statement

1.2.24 The UK Marine Policy Statement (Ref. 1.19), published in March 2011, states that “*When developing marine plans, marine plan authorities should be satisfied that air quality impacts have been taken into account*”. The impacts of air quality to onshore and offshore sensitive receptors have been considered in the air quality assessment for the main development site by considering ecological receptors with statutory designation and human health receptors within the study area defined in **section 1.3** of this chapter.

c) Regional

1.2.25 The Suffolk Local Transport Plan (Parts 1 and 2) (Ref. 1.20) prioritises the need for improving air quality through reduced transport emissions and reducing the impact of poor air quality on local communities. The Local Transport Plan identifies local air quality action plans as a means to achieve these priorities.

d) Local

1.2.26 The Sizewell C Project main development site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as

a new local authority, to replace both SCDC and Waveney District Council. On 1 April 2019, ESC was formally established in place of SCDC and Waveney District Council.

1.2.27 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan (SCLP) and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the SCLP.

1.2.28 The adopted SCLP comprises the: 'saved policies' of the SCLP (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref.1.21).

1.2.29 In March 2019, SCDC submitted their draft new SCLP (January 2019) (Ref 1.22) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. **Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies**

1.2.30 The SCLP (July 2013) includes the Core Strategy and Development Management Policies Development Plan Document (Ref. 1.22), setting out the strategic vision for the district and the Site-Specific Allocations and Area Specific Policies Development Plan Document.

1.2.31 Strategic Policy SP13 (Ref. 1.22), in respect of air quality effects from additional nuclear power stations at Sizewell, requires the consideration of ecological impacts on nearby designated sites, construction management and transport issues having regard to such factors as residential amenity.

1.2.32 Development Management Policy DM23 (Ref. 1.22) requires that the ESC will have regard to air quality when considering the impact of new development on residential amenity. The SCLP also highlights the designation of several AQMAs within the district and the need to ensure that new development does not result in additional AQMAs being declared.

1.2.33 AQMAs have been declared for three locations within the administrative area of ESC, one in Stratford St Andrew and one in Woodbridge, both for the potential for exceedance of the annual mean NO₂ air quality objective at several properties on the A12 and in Woodbridge centre, and a third in Felixstowe which was revoked in 2016. Consultation has been undertaken on this declaration and an air quality action plan has been prepared by ESC.

ii. **Suffolk Coastal District Council Final Draft Local Plan**

1.2.34 The SCLP (Final Draft Plan) (Ref. 1.23), published in January 2019, sets out policies to be used to determine planning applications across Suffolk Coastal.

1.2.35 Policy SCLP10.3: Environmental Quality states that “*Development proposals will be expected to protect the quality of the environment and to minimise and where possible, reduce all forms of pollution and contamination. Development proposals will be considered in relation to impacts on; a) Air quality, and the impact on receptors in Air Quality Management Areas... Proposals should seek to secure improvements in relation to the above where possible*”.

1.2.36 Policy SCLP11.2: Residential Amenity states that “*When considering the impact of development on residential amenity, the Council will have regard to the following: g) Air quality and other forms of pollution... Development will not cause an unacceptable loss of amenity to neighbouring or future occupiers of development in the vicinity*”.

e) **Guidance**

1.2.37 The assessment has been undertaken in accordance with the following statutory guidance documents:

- Environment Agency, risk assessment for specific environmental permits (Ref. 1.24), which presents guidance on the assessment of impacts of emissions from processes regulated under the Environmental Permitting Regulations (Ref.1.12).
- Environment Agency, technical guidance on detailed modelling approach for an appropriate assessment of emissions to air (Ref. 1.25), including details of pollutant deposition calculations.
- Highways England, Design Manual for Roads and Bridges Advice Note HA207/07 (Ref. 1.26), which provides advice for the assessment of strategic highway schemes, and includes methods that are useful for the assessment of emissions from roads in general.

1.2.38 Where an aspect of the assessment is not the subject of statutory guidance on assessment methods, then good practice guidance published by professional institutions has been referred to. For example, the Institute of Air Quality Management (IAQM) has published several guidance documents that set out a framework for assessing air quality impacts and provides

indicative examples of how such assessments might be reported. Other technical documents that have served to inform the assessment method include:

- IAQM and Environmental Protection UK, Land-Use Planning & Development Control: Planning for Air Quality (Ref. 1.27), which provides a framework for undertaking an air quality impact assessment for a development, together with examples for the presentation and content of the assessment. The document states that it has no formal or legal status and is not intended to replace other guidance.
- IAQM, Guidance on the Assessment of Dust from Demolition and Construction Sites (Ref. 1.28), which presents a precautionary qualitative method for the assessment of risk of effects from dust emissions from construction and demolition activities and proposes a range of good practice mitigation measures for activities with a defined dust risk.
- IAQM, Guidance on Monitoring in the Vicinity of Demolition and Construction Sites (Ref. 1.29), provides advice of proportionate approaches to monitoring air pollutants at demolition and construction sites.
- IAQM, A guide to the assessment of air quality impacts on designated nature conservation sites (Ref. 1.30), provides advice on whether a 'likely significant effect' on a habitat can be screened out, and otherwise the air quality impacts that may be used by an ecology specialist to determine an effect on a habitat.
- National Atmospheric Emissions Inventory (Ref. 1.31), provides emission factors for activities that emit air pollutants including emissions from freight and passenger trains.

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES**.

1.3.2 This section provides a summary of the air quality assessment methodology. The scope of assessment considers the impacts of the construction, operation, and post-operational use/restoration and reinstatement where

relevant, of the proposed development. Any site-specific additions to the methodology are described within those volumes.

- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the planning inspectorate. A request for an EIA Scoping Opinion was initially issued to the planning inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Volume 1, Appendices 6A to 6C** of this volume.
- 1.3.5 The scope of the air quality assessments during construction, operation and the removal and reinstatement phases, where relevant, for the Sizewell C Project includes:
- emissions of NO_x including NO₂ from engines (road vehicles, rail locomotives, combined heat and power engine, non-road mobile machinery and non-mobile plant);
 - emissions of CO and SO₂ from engines (rail locomotives and non-mobile plant only);
 - emissions of particulate matter (PM₁₀ and PM_{2.5} size fractions) from engines (road vehicles, rail locomotives, non-road mobile machinery, non-mobile plant);
 - emissions of fugitive particulate matter (dust and PM₁₀ size fractions) from demolition, construction and removal and reinstatement phase works, where relevant;
 - changes in air pollutant concentrations and changes in dust deposition rates (sometimes referred to as soiling).
- 1.3.6 Emissions from stationary generators (non-mobile plant) that fall under the relevant legislation are considered within **Volume 2, Chapter 12** of the **ES**. No non-mobile plant are proposed to be used during the operational phase of the associated development and therefore the assessment of non-mobile plant is limited to the main development site only.
- 1.3.7 Mobile generators used in construction are exempt from the regulations defining emission limits to air (with certain exceptions for which standard rules permits are applied) and therefore emissions from mobile generators are considered not significant, and are therefore scoped out of the

assessment. Any mobile generators employed during the construction of associated development would be used subject to the **CoCP** (Doc Ref. 8.11), which defines the conditions under which use of mobile generators would be allowed.

1.3.8 Emissions associated with non-road mobile machinery (NRMM), such as excavators, bulldozers and mobile cranes used within the construction phase and restoration and reinstatement phase, have also been included within the scope of the air quality assessment for the Sizewell C Project. The IAQM guidance (Ref. 1.28) states: “*Experience of assessing the exhaust emissions from on-site plant ... and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur.*” The likely effect of emissions from NRMM have been considered as part of the qualitative risk assessment for the activities to be undertaken. For example, the location, frequency and scale of NRMM use is taken into account in considering the risks associated with earthworks, as normal methods of work are dependent upon the use of NRMM. The NRMM employed would meet the stage IIIB engine standards of the NRMM emission standards directive (Ref. 1.32).

1.3.9 The impact of NRMM emissions from the use of haulage vehicles within the main development site on the haul road between the main construction area and the main development site are quantified within **Volume 2, Chapter 12** of the **ES**.

b) Consultation

1.3.10 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co.’s responses are detailed in **Table 1.3**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.

Table 1.3: Summary of consultation responses that have informed the scope and methodology of the air quality assessment

Consultee	Date	Summary of Discussion/Comments
SCDC Suffolk County Council (Meeting).	20 October 2016.	General agreement on proposed modelling and assessment methodologies for traffic emissions; use of Euro VI emission standards and Defra EFT7;

Consultee	Date	Summary of Discussion/Comments
		regard for local air quality management within assessment of operation combustion plant; consideration of coastal path users; use of 200mg/m ² /d dust soiling threshold and assessment approach using IAQM (Ref. 1.28) and United States Environmental Protection Agency (US EPA) AP-42 methodology (Ref. 1.35); discussion of future monitoring requirements.
Suffolk County Council (Meeting).	May 2019.	Responses to Stage 3 consultation. New Integrated road and rail scheme. Adopt IAQM “highly recommended” embedded mitigation for construction dust control. Campus energy provision and assessment.
ESC Suffolk County Council (Workshop).	12 June 2019.	Recommended an amended approach to gauge the risk of short-term NO ₂ objectives being breached. Recommended to present a modelling scenario using peak construction traffic flows from each scheme or justify calculation of construction traffic flows in a more realistic scenario. Recommended to use IAQM’s more sensitive traffic screening criteria within AQMA’s and areas at risk of higher pollutant concentrations.

c) Baseline

i. Study area

- 1.3.11** The air quality assessment considers a range of different emissions to air from different source types. Due to the varied physical and chemical properties of emissions, the associated assessment methods adopt study areas that differ in spatial extent, as recognised in published guidance and set out below. The study areas for each source type are considered in turn within this section.
- 1.3.12** In particular, the study areas are defined separately for the construction and operational phases. Impacts during removal and reinstatement, where this would be undertaken, are considered to be similar to the construction phase impacts and therefore the study area is as defined for the construction phase.
- 1.3.13** The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the air quality chapters of those volumes - **Volume 2, Chapter 12**, and **Volumes 3 to 9, Chapter 5** of the **ES**.

Construction

Construction dust

1.3.14 The study area for the assessment of dust impacts during construction is based on the criteria detailed in the IAQM guidance (Ref. 1.29). Beyond these distances dust effects from construction activities can be expected to be negligible:

- human receptors within 350 metres (m) of potential dust sources or within 50m of the public highway along routes used by construction vehicles that are within 500m of the construction site access; and
- ecological receptors within 50m of potential dust sources, or within 50m of the public highway along routes used by construction vehicles that are within 500m of the construction site access.

Non-mobile plant emissions

1.3.15 The study area for the assessment of non-mobile plant emissions impacts at human health receptors from non-mobile plant is not defined within the statutory guidance. A study area extending up to 2km from the source has been identified as an appropriate study area, based on the emission parameters and professional judgement. The closest residential receptors have been assessed as the compliance point, and additional transient receptors, such as amenity users, have been identified and assessed against any very short-term air quality objectives (less than 1-hour averaging time).

1.3.16 The study area for the assessment of non-mobile plant emissions, such as power generation plant, during the construction and operational phases, is based on Environment Agency guidance (Ref. 1.29);

- ecological receptors designated under international legislation (including Ramsar sites and Natura 2000 sites) up to 10 kilometres (km) from the source; and
- ecological receptors designated under national legislation (e.g. sites of special scientific interest (SSSI) and national nature reserves (NNR)) and locally designated sites (e.g. county wildlife sites) up to 2km from the source.

Road traffic emissions

- 1.3.17 The **Transport Emissions Assessment** as seen in **Volume 2, Appendix 12B** of the **ES**, details the technical dispersion modelling method and predicted air pollutant concentrations for all assessment scenarios of the Sizewell C Project, including figures illustrating the extent of the affected road and rail networks, within the construction and operation of the proposed development.
- 1.3.18 The affected road network represents the road links that are considered to have the potential to experience a large enough change in road traffic movements or change in composition of the fleet to be able to affect local air quality, as defined in **Table 1.4**. The study area extends 200m from the individual road links comprising the affected road network.
- 1.3.19 In summary, the study area for the affected road networks includes:
- the A12 between Ipswich and Lowestoft;
 - the B1122 between A12 and the main development site;
 - sections of highway to be built or modified as part of the Sizewell C Project;
 - road links within AQMA; and
 - other roads that are likely to experience a change in traffic flow above the criteria listed in **Table 1.4** as a result of the proposed development.

Table 1.4: Affected road network links – selection criteria

Parameter Changed as a Result of Proposed Development	Criteria	Reference
Road alignment change.	5m or more.	HA 207/07 (Ref. 1.26).
Change in total two-way annual average daily traffic (AADT) flows.	1000 or more.	HA 207/07(Ref. 1.26).
Change in daily average speed.	10 km/hr or more.	HA 207/07(Ref. 1.26).
Change in peak hour speed.	20 km/hr or more.	HA 207/07(Ref. 1.26).
Change in two-way AADT flows of light duty vehicles within or adjacent to an AQMA.	Additional 100 vehicles/day (veh/day) or more, from the Sizewell C Project.	IAQM (Ref. 1.26).

Parameter Changed as a Result of Proposed Development	Criteria	Reference
Change in two-way AADT flows of heavy duty vehicles (HDVs) within or adjacent to an AQMA.	Additional 25 veh/day or more, from the Sizewell C Project.	IAQM (Ref. 1.26).
Change in two-way AADT flows of light duty vehicles not within or adjacent to an AQMA.	Additional 500 veh/day or more, from the Sizewell C Project.	IAQM (Ref. 1.26).
Change in two-way AADT flows of HDV not within or adjacent to an AQMA.	Additional 100 veh/day or more, from the Sizewell C Project.	IAQM (Ref. 1.26).

Rail operations emissions

- 1.3.20 The study area for effects from emissions from railway locomotives extends 200m from the existing Saxmundham to Leiston branch line and any new build sections of railway. There is no defined guidance for study area definition therefore the limit of significant impacts based on the emission parameters and professional judgement is considered to be comparable to that for road traffic.

Operation

Non-mobile plant emissions

- 1.3.21 The study area for the assessment of non-mobile plant emissions for the operational phase, is as described above for the construction phase.

Road traffic emissions

- 1.3.22 The study area for the assessment of road traffic emissions for the operation phase, is as described above for the construction phase.

ii. Establishing the baseline

Receptors

- 1.3.23 Air quality receptors were identified through a combination of desk studies, consultations and site visits. The assessment uses representative receptor locations that are located such that they will experience the same impact or a greater impact than other relevant receptors in the vicinity. The representative receptors are detailed in **Volume 2, Appendix 12B** of the **ES**.

- 1.3.24 Potential future air quality receptors have been identified through examination of committed developments identified as part of the cumulative impact assessment, as detailed in **Volume 2, Chapter 12B** of the **ES**.
- 1.3.25 Where a single property has been used to consider impacts from different types of emissions sources, then as appropriate, a subscript has been added to the receptor label to identify the location at which a specific impact has been considered. For example, the nearest point of a building facade would be selected to consider impacts from road traffic emissions, while a point at the property boundary would be selected to consider potential impacts from dust emissions on the amenity of a garden.

Air quality

- 1.3.26 The current and future year baseline pollutant levels have been established through a review of existing published data from Defra and local authorities, and monitoring surveys.
- 1.3.27 Air quality is not a static condition, but changes constantly. In addition to the short-term changes associated with the variable nature of activities emitting air pollutants and of meteorological conditions, there are also reasonably foreseeable trends in baseline conditions. The baseline air quality conditions in future years are calculated based on projected future contributions from background sources and from local sources. The methods used to derive baseline conditions are considered in turn below for each of the emission source types.
- 1.3.28 The baseline dust deposition rate in the vicinity of the main development site was monitored over a period of 12 months during 2016–17, using passive frisbee type deposition gauges to determine the existing dust environment. Future baseline dust deposition is not anticipated to vary significantly over the current baseline without additional sources in the vicinity of the proposed development. Further details are provided in **Volume 2, Chapter 12** of the **ES**.
- 1.3.29 Baseline air quality monitoring was undertaken in 2010. Monitoring was carried out between March 2010 and September 2010, and the reports adjusted, as detailed in Defra guidance, to represent 2009 annual mean baseline concentrations. The survey included one measurement location on the Sizewell B power station site, at which PM₁₀ and NO₂ were measured with continuous analysers. SO₂ and NO₂ diffusion tubes were also deployed. Eight other passive sampling locations for SO₂ and NO₂ diffusion tubes were also included, three of which were ‘roadside’ locations, four were ‘rural background’ sites and one was a ‘background’ ecological habitat site.

- 1.3.30 The current baseline conditions were calculated for scenarios used in the assessment of road traffic emissions and for this element of the assessment, baseline measurement data from local authority measurements and additional NO₂ diffusion tube sampling location set up in 2019 as seen in **Volume 2, Appendix 12E** of the **ES**, were used to calibrate the performance of the modelling method. Further details are provided in the Transport Emissions Assessment provided in **Volume 2, Appendix 12B** of the **ES**.
- 1.3.31 A baseline dust climate survey was carried out between September 2016 and September 2017. The resulting baseline data from this survey provides a point of reference for the air quality assessment studies as it defines the current levels of dust deposition experienced with in the study area.
- 1.3.32 Baseline pollutant levels and loading at ecological receptors were determined from existing published data from the Air Pollutant Information System (Ref. 1.9).

d) [Assessment scenarios](#)

i. [Construction](#)

- 1.3.33 The construction assessment scenarios vary between the main development site and the associated development sites and the scenarios are described within the methodology sub-section of the air quality chapters of those volumes - **Volumes 2 to 9** of the **ES**.
- 1.3.34 The nature of the emissions to air and the assessment methods presented in this section are sufficiently different to have been sub-divided into: on-site dust and particulates emissions from construction activities, such as earthworks and haul routes; off-site emissions from road traffic movements on the public highway; and emissions from non-mobile plant, such as power generation plant.

[Assessment of construction dust](#)

- 1.3.35 The movement and handling of soils and material during construction activities can lead to the generation of air-borne dust and inhalable particulate matter. The potential for generation of dust by heavy earth moving operations, and its subsequent impaction on surfaces, or re-suspension in the air, depends heavily upon the meteorological and ground conditions at the time and location of the work, and the nature of the activity being carried out.

- 1.3.36 The approach taken has been to identify the risk of significant adverse environmental effects at the design stage, based on the published guidance by the IAQM (Ref. 1.28); to identify the scale of risk associated with unmitigated activities on identified receptors and the required level of mitigated based on the risk, and to embed appropriate mitigation, including the use of good working practices to minimise dust formation within the proposals. Where necessary additional site-specific mitigation has been identified to control the risk of dust emissions at specific locations or for specific periods of time. The mitigation described in the IAQM guidance has been defined such that residual effects would be **not significant**.
- 1.3.37 A precautionary approach has been applied to the Sizewell C Project, with dust mitigation measures recommended by IAQM for a ‘high dust risk’ site being adopted in the **CoCP** (Doc Ref. 8.11) at all Sizewell C Project sites, even if actual risks are lower within a particular site or phase of works.
- 1.3.38 Consideration has also been given to the potential for cumulative dust effects from construction of the proposed development and other committed developments. This is assessed using the same methodology, and presented in **Volume 10** of the **ES** (Doc Ref. 6.11).

Assessment of non-mobile plant emissions

- 1.3.39 Non-mobile plant such as stationary power generators require an Environmental Permit to be operated and the impact assessment supporting the Environmental Permit Application for those plant forms the basis of the assessment presented in **Chapter 12, Appendix 12A** of the **ES**. For smaller plant, that may not require an Environmental Permit, such as the Campus combined heat and power (CHP) plant, have been assessed using the same methods.
- 1.3.40 The impacts from the campus combined heat and power (CHP) engine have been assessed based on proposed system parameters detailed in the **Description of Construction (Volume 2, Chapter 3)**. This assessment assumed continuous use of the CHP engine with the minimum suggested stack height to contribute a conservative prediction of pollutant concentrations.
- 1.3.41 The impacts from construction phase non-mobile plant emissions have been assessed using the Environment Agency’s risk assessment method (Ref. 1.24). Emissions to air from the point sources have been modelled, using the proprietary detailed dispersion model Atmospheric Dispersion Modelling System (ADMS) 5.2 and representative meteorological data from Wattisham station, to determine the likely worst-case Process Contributions at sensitive

receptor locations. These have been added to the background pollutant concentrations to determine the overall Predicted Environmental Concentration (PEC) at sensitive receptor locations, which have then been assessed against air quality standards, and critical loads and critical levels for designated ecological habitat sites.

ii. Traffic

Construction years

1.3.42 The impacts from road and rail traffic emissions during construction have been quantified and assessed for the following scenarios:

- early construction year baseline scenario in 2023;
- early construction year scenario in 2023;
- peak construction year baseline scenario in 2028; and
- peak construction year scenario in 2028.

1.3.43 The method used to quantify impacts is set out in detail in the **Transport Emissions Assessment** in **Volume 2, Appendix 12B** of the **ES**. The approach uses the dispersion model ADMS Roads, emission factor data published by Defra (Ref. 1.33) and the National Atmospheric Emissions Inventory (Ref. 1.29), representative meteorological data from Wattisham station and forecast activity levels from the **Transport Assessment** (Doc Ref. 8.5).

1.3.44 For the main development site and associated development sites, the assessment reports the impacts at receptors within the relevant study area, as subsets of results from the scenarios presented in the **Transport Emissions Assessment** in **Appendix 12B** of **Volume 2** of the **ES**.

Operational year

1.3.45 The impacts from road emissions have been quantified for the following scenarios:

- operational opening year baseline scenario in 2034; and
- operational year scenario in 2034.

1.3.46 The assessment method used for the operational phase is the same as for the construction phase road traffic emissions.

iii. Sizewell C operations

Non-mobile plant emissions

- 1.3.47 The impacts from operation phase non-mobile plant emissions, including the emergency diesel generators and ultimate diesel generators that comprise the emergency power plant for the nuclear power station, have been assessed using the Environment Agency's risk assessment method (Ref. 1.24). Emissions to air from the point sources have been modelled, using the proprietary model ADMS5.2 and representative meteorological data from Wattisham station, to determine the likely worst-case process contributions at sensitive receptor locations. These have been added to the background pollutant concentrations to determine the overall PEC at sensitive receptor locations, which have then been assessed against air quality standards, and critical loads and critical levels for designated ecological habitat sites.

e) Assessment criteria

- 1.3.48 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.
- 1.3.49 A summary of the assessment criteria used in the air quality assessment is presented in the following sub-sections.

i. Sensitivity

- 1.3.50 For the assessment of construction phase dust effects the approach used to define the sensitivity of individual receptors and of the study area as a whole, is set out in **Annex 6H.1**. Receptor sensitivity is determined for both dust deposition (enjoyment of amenity affected by dust soiling) and PM₁₀ health impacts (the presence of receptors, and the duration of their presence). Ecological sensitivity is determined through a hierarchical approach, according to the designation status of a site and consideration of any specific designation for dust sensitive features.
- 1.3.51 The national air quality objective values for certain pollutants have been set by the expert panel of air quality standards at a level below the lowest concentration at which the more sensitive members of society, including more vulnerable groups, such as the very young, elderly or unwell, have been observed to be adversely affected by exposure to each pollutant. This means that all air quality receptors, which represent exposure of the public, are of

equal sensitivity as any member of the public could be present at those locations. As such, the sensitivity of receptors was considered in the definition of the air quality objective values, as described in **Table 1.2**, and therefore no additional subdivision of human health receptors is necessary.

- 1.3.52 The sensitivity of vegetation and ecological habitats to pollutants with defined critical levels or critical loads may depend on a range of factors including the species present within a site, soil type and other environmental pressures such as water availability. The critical levels defined in the National Air Quality Strategy (Ref. 1.7), for atmospheric pollutant levels, apply to all designated ecological habitat sites, regardless of habitat type. Ecological habitats with Natura 2000 designation and SSSI designation are ascribed a greater value and may feature species with greater sensitivity to changes in pollutant levels. For these sites, critical loads are defined for the deposition of nitrogen and acid, dependent on the species that are specific to the habitats present at a site (Ref. 1.8).

ii. Magnitude

- 1.3.53 The magnitude of change is described using different, method-specific approaches in accordance with guidance, however all methods ascribe a high magnitude of impact where emissions from the proposed development would result in exceedance of a statutory air quality standard in combination with the baseline, and a lower magnitude impact where emissions would not exceed a standard in combination with the baseline.

Construction dust

- 1.3.54 For the assessment of construction phase impacts from dust emissions, the approach is risk based and does not include a magnitude of impact step. Instead the approach is based on relative risk of impacts. Details are provided in **Annex 6H.1**.

Non-mobile plant emissions

- 1.3.55 The magnitude of non-mobile plant emissions have been evaluated based on the Environment Agency's risk assessment method (Ref. 1.32).
- 1.3.56 The Environment Agency's Environmental Permitting Regulations risk assessment (Ref. 1.32) screening criteria for comparison of process contributions with Air Quality Standards (AQS) (Ref. 1.7) state that an emission may be considered imperceptible (or negligible) impact where the magnitude of:

- short-term process contributions are less than or equal to 10% of the AQS; and
- long-term process contributions are less than or equal to 1% of the AQS.

1.3.57 The second stage of screening considers the process contributions in the context of the existing background pollutant concentrations; the PEC is considered acceptable without more detailed assessment where the magnitude of:

- short-term process contributions are less than 20% of the short-term AQS minus twice the long-term background concentration; and
- long-term PEC (process contributions + background concentration) are less than 70% of the AQS.

1.3.58 The impacts of non mobile plant emissions on ecological receptors with statutory designation e.g. SSSI have been evaluated using the Environment Agency criteria (as above) for short-term and long-term AQS for ecological receptors. For short-term impacts, where the magnitude of process contributions are more than 100% of the AQS the Environment Agency guidance indicates that an impact of this magnitude may require more detailed assessment to inform the definition of effect.

1.3.59 The impact of non mobile plant emissions on ecological receptors with statutory designation, through deposition of nutrient nitrogen or acidity, has been evaluated using the Environment Agency criterion of 1% of the long-term AQS, as above. The impact of point source emissions on non-statutory designations (local wildlife sites) have been evaluated using the Environment Agency criterion of requiring the magnitude of the process contributions to be no greater than the short-term and long-term AQS for ecological receptors.

Road traffic emissions

1.3.60 For the assessment of road traffic emissions, the predicted magnitude of impacts are described based on the magnitude of change as a percentage of the air quality objective value. These classifications are set out in **Table 1.5**.

Rail operations emissions

1.3.61 For the assessment of rail emissions, as for road traffic emissions, the predicted magnitude of impacts are described based on the magnitude of

change as a percentage of the air quality objective value. These classifications are set out in **Table 1.5**.

Table 1.5: Determination of magnitude of change – transport emissions

Magnitude of Change Descriptor	Substance	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)	Justification
High	NO ₂ and PM ₁₀ .	Increase/decrease more than 4.	Change in concentration relative to air quality objective value of more than 10% (Ref. 1.27).
	PM _{2.5}	Increase/decrease more than 2.5.	
Medium	NO ₂ and PM ₁₀ .	Increase/decrease 2 to 4.	Change in concentration relative to air quality objective value of between 6% and 10% (Ref. 1.27).
	PM _{2.5}	Increase/decrease 1.4 to 2.5.	
Low	NO ₂ and PM ₁₀ .	Increase/decrease 0.8 to 1.9.	Change in concentration relative to air quality objective value of between 2% and 5% (Ref. 1.27).
	PM _{2.5}	Increase/decrease 0.5 to 1.3.	
Very Low	NO ₂ and PM ₁₀ .	Increase/decrease 0.4 to 0.7.	Change in concentration relative to air quality objective value of 1% (Ref. 1.27).
	PM _{2.5}	Increase/decrease 0.3 to 0.4.	
Imperceptible	NO ₂ and PM ₁₀ .	Increase/decrease less than 0.4.	Change in concentration relative to air quality objective value of less than 1% (Ref. 1.27).
	PM _{2.5}	Increase/decrease less than 0.3.	

1.3.62 The magnitude of impacts on vegetation or ecological habitats are described as a percentage of the respective critical level or critical load value.

iii. Effect definitions

Construction dust

1.3.63 The definition of appropriate mitigation for construction phase dust emissions, through the risk assessment approach, is such that residual impacts may be considered to be not significant. Details are provided in **Annex 6H.1**.

Non-mobile plant emissions

1.3.64 The evaluation of the significance of air quality effects has been based on the Environment Agency's risk assessment method (Ref. 1.32), which

indicates that where EU Air Quality Limits, national air quality objectives or target values for human health are likely to be breached as a result of the process contributions, or where installation releases constitute a major proportion of the standard or objective, such releases are likely to be considered unacceptable and therefore have significant effect; where the magnitude of the impact (process contribution) is below the screening criteria, the effect at the individual receptor is considered to be not significant.

- 1.3.65 The air quality effects on ecological receptors with statutory designation can be assumed to be insignificant without the need for more detailed assessment, where the magnitude of impact does not exceed the defined magnitude of impact criteria. Where a criterion is exceeded, the determination of effect on the receptor should be made by a suitably qualified ecologist. The determination of significance of effect of air quality impacts on ecological receptors with statutory designation is described in the terrestrial ecology and ornithology assessments of **Volumes 2 to 9** of the **ES**.

Road traffic emissions

- 1.3.66 The evaluation of the significance of air quality effects has been based on professional judgement and the criteria outlined in the Environmental Protection UK and IAQM publication (Ref. 1.27) (as shown in **Table 1.6** and **Table 1.7**). There are a number of aspects that must be taken into account when assessing the significance of an effect. These are:
- the magnitude of the change caused by the proposed development;
 - the absolute predicted environmental concentration in relation to the air quality objectives;
 - the likely duration of effects; and
 - the level of uncertainty associated with effects (i.e. the extent to which worst case assumptions have been utilised).
- 1.3.67 As described above, the sensitivity of receptors was considered in the definition of the air quality objective values, as described in **Table 1.2**, and therefore no additional subdivision of human health receptors is necessary.
- 1.3.68 The terminology used in **Table 1.6** and **Table 1.7** has been modified slightly from the Environmental Protection UK/IAQM guidance in order to maintain consistency with the assessments presented in other technical chapters of this **ES**. Major is used instead of substantial and minor in place of slight. The

description of each effect category, as well as the terms moderate and negligible, remain the same.

Table 1.6: Effect descriptors at individual receptors – annual mean NO₂ and PM₁₀

Annual mean pollutant concentration at receptor in assessment year (µg/m ³)	Magnitude of impact				
	Imperceptible	Very low.	Low	Medium	High
Less than or equal to 30.2.	Negligible	Negligible	Negligible	Minor	Moderate
Greater than 30.2 to 37.8.	Negligible	Negligible	Minor	Moderate	Moderate
Greater than 37.8 to 41.1.	Negligible	Minor	Moderate	Moderate	Major
Greater than 41.1 to less than 43.8.	Negligible	Moderate	Moderate	Major	Major
Greater than or equal to 43.8.	Negligible	Moderate	Major	Major	Major

Table 1.7: Effect descriptors at individual receptors – annual mean PM_{2.5}

Annual mean pollutant concentration at receptor in assessment year (µg/m ³)	Magnitude of impact				
	Imperceptible	Very low.	Low	Medium	High
Less than or equal to 18.9.	Negligible	Negligible	Negligible	Minor	Moderate
Greater than 18.9 to 23.6.	Negligible	Negligible	Minor	Moderate	Moderate
Greater than 23.6 to 25.6.	Negligible	Minor	Moderate	Moderate	Major
Greater than 25.6 to less than 27.4.	Negligible	Moderate	Moderate	Major	Major
Greater than or equal to 27.4.	Negligible	Moderate	Major	Major	Major

1.3.69 The descriptors are for individual receptors only and the overall significance is determined using professional judgement. Additionally, it is noted that it is

unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the objective value. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why the effect categories have been assigned a range around the objective value, rather than being exactly equal to it.

- 1.3.70** A change in predicted annual mean concentrations of NO₂, PM₁₀ or PM_{2.5} of less than 0.5% is considered to be so small as to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.
- 1.3.71** Changes of 1% of a relevant air quality objective could, under the Environmental Protection UK/IAQM guidance adopted for this assessment, result in minor to moderate air quality effects at individual receptors. This assessment also inherently considers cumulative impacts through the use of traffic data, Defra background concentrations and predictions at committed developments. Therefore, it is considered highly unlikely that significant air quality effects could occur with the proposed development for changes in concentrations of 1% or less. A 1% threshold for insignificance is typically used by the Environment Agency and Natural England, as outlined in their respective guidance (Ref. 1.24 and Ref. 1.34), when considering the significance of effects and this is applied here.
- 1.3.72** The assessment also includes the potential for minor to major air quality effects as a result of changes in pollutant concentrations between 2 and 5% of relevant air quality objectives. For annual average NO₂ concentrations, this relates to changes in concentrations ranging from 0.6 – 2.1 µg/m³. In practice, changes in concentration of this magnitude, and in particular changes at the lower end of this band are likely to be very difficult to distinguish through any post operational monitoring regime due to the number of sources of NO₂ in a rural environment and the inter annual effects of varying meteorological conditions. Therefore, in the overall evaluation of significance, the potential for significant air quality effects within this band has been considered in this context.
- 1.3.73** Changes in concentration of more than 5% (the two highest bands) are considered to be of a magnitude which is far more likely to be discernible and as such carry additional weight within the overall evaluation of significance for air quality.

- 1.3.74 Particular significance has been given to a change that takes the concentration from below to above the AQS objective or vice versa because of the importance ascribed to the objectives in assessing local air quality.
- 1.3.75 Following the classification of an effect as presented in **Table 1.6** or **Table 1.7**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

Rail operations emissions

- 1.3.76 Rail emissions are assigned a classification of effect as for road traffic emissions, detailed above, as the dispersion modelling methods are very similar and the pollutants are the same. Published guidance for the effects of rail operations on local air quality are much less well developed than the equivalent guidance for emissions for roads.

f) Inter-relationships

- 1.3.77 The assessment considers the combined contributions of different sources of the same pollutant on each sensitive receptor, to evaluate the inter-relationship of, for example, traffic emissions and emissions from non-mobile sources. The combined contributions are compared against the relevant air quality objectives to determine the percentage change and whether any exceedance of air quality objectives is predicted to occur. The methodology does not consider whether there is an inter-relationship between impacts of different pollutants on the same receptor, as the air quality objectives for each pollutant are set for the protection of the most sensitive parts of the general population.
- 1.3.78 For effects on designated ecological receptors, nitrogen deposition and acid deposition are calculated based on the total loading resulting from emissions from the proposed development.
- 1.3.79 The inter-relationships are presented in the environmental topic chapters within **Volumes 2 to 9** of the **ES**.

g) Assumptions and limitations

- 1.3.80 The following assumptions have been made in the assessments undertaken for each of the Sizewell C Project sites:

- Air quality objectives will remain unchanged during the periods assessed.
- 1.3.81 No specific limitations have been identified other than the inherent uncertainties associated with predictive modelling of air quality impacts.
- 1.3.82 Site-specific or assessment specific assumptions and limitations are detailed in the relevant assessment chapters of **Volumes 2 to 9** of the **ES**.

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Appendix 6H.1: Construction Phase On-site Emissions, Qualitative Dust Risk Assessment Methodology

1.1 Introduction

1.1.1 The assessment of likely effects from potential dust emissions during construction phase activities has been assessed using the approach described in **Volume 1, Appendix 6H**, Air Quality. The assessment method is based on the use of professional judgement to consider the ability of embedded mitigation measures to control the risk of emissions such that significant effects are not experienced at sensitive receptor locations.

1.1.2 The assessment is informed by a qualitative risk assessment that uses an approach proposed by the IAQM, published as Guidance on the Assessment of Dust from Demolition and Construction (Ref. 1.26). This appendix details the assessment methodology as applied in this assessment.

1.1.3 The assessment follows a stepped approach:

- Step 1 – initial screening by distance to identify potentially sensitive receptors (as described in **Appendix 6H, section 1.3** baseline, study area);
- Step 2 – assessment of the potential risks of dust impacts, based on the source-pathway-receptor linkage, sub-divided into the following three tasks:
 - 2a: description of the potential uncontrolled dust generation magnitude;
 - 2b: determination of individual receptor sensitivity and then definition of the sensitivity of the area; and
 - 2c: definition of the risk of impacts;
- Step 3 – identification of appropriate mitigation measures, based initially on the level of assessed risk;
- Step 4 – determination of significance of likely effects with embedded mitigation in place;
- Step 5 – if necessary, identify additional site-specific mitigation measures and assess the significance of likely residual effects.

- The definition of appropriate mitigation through Steps 4 and 5 is such that residual impacts may be considered to be **not significant**.

a) Describing the magnitude of potential emissions

1.1.4 The potential uncontrolled dust generation magnitude is defined based on the likely scale and frequency of activities. Activities are considered within four groups:

- demolition (including building demolition and on-site crushing and screening);
- earthworks (including stockpiling, excavation and soil stripping);
- construction (including on-site concrete batching); and
- trackout (HDV movements on unpaved roads and the transfer off-site of mud onto the highway). Trackout can result in the dust source migrating beyond the impact zone of the site boundary and this is reflected in the greater screening distance used for large construction sites.

1.1.5 The IAQM suggested criteria for the assignment of magnitude descriptors have been adopted in this assessment and are summarised in **Table 1.1**.

Table 1.1: Screening assessment criteria for potential dust emission magnitude

Potential Magnitude of Emission	Demolition	Earthworks	Construction	Trackout
Large	Total building volume more than 50,000m ³ , potentially dusty construction material (e.g. concrete) on-site crushing & screening, demolition activities more than 20m above ground.	Site area more than 1Ha, potentially dusty soil type (e.g. clay), more than 10 heavy earth moving vehicles at once, bunds more than 8m high, total material moved more than 100,000t.	Total building volume more than 100,000m ³ , on-site concrete batching, sandblasting.	More than 50 HDV (more than 3.5t) peak outward movements per day, potentially dusty surface material (e.g. high clay content), unpaved road length more than 100m.
Medium	Total building volume 20,000-50,000m ³ , potentially dusty	Site area 0.25-1Ha, moderately dusty soil type (eg silt), 5-10 heavy	Total building volume 25,000-100,000m ³ , potentially dusty	10-50 HDV (more than 3.5t) peak outward movements per

Potential Magnitude of Emission	Demolition	Earthworks	Construction	Trackout
	construction material, demolition activities 10-20m above ground.	earth moving vehicles at once, bunds 4-8m high, total material moved 20,000-100,000t.	materials eg concrete, on-site concrete batching.	day, moderately dusty surface material (eg high clay content), unpaved road length 50-100m.
Small	Total building volume less than 20,000m ³ , construction material with low potential for dust (eg metal/timber), demolition activities less than 10m above ground, demolition during wetter months.	Site area less than 0.25, large grain soil type (eg sand), less than 5 heavy earth moving vehicles at once, bunds less than 4m high, total material moved less than 20,000t.	Total building volume less than 25,000m ³ , low dust potential construction materials eg metal/timber.	Less than 10 HDV (more than 3.5t) peak outward movements per day, surface material low dust potential, unpaved road length less than 50m.

b) Receptor sensitivity

1.1.6 At Step 2b, the likely sensitivities of human receptors, to dust deposition (soiling) of property, and to particulate health effects (PM₁₀); and the likely sensitivities of ecological habitats to dust deposition effects (chemical and physical), are identified using the criteria summarised in **Table 1.2**.

1.1.7 The initial level of sensitivity assigned to a receptor may be modified to take account of location-specific or activity-specific circumstances and the justification for the reassignment is reported. In this assessment, consideration of location-specific or activity-specific circumstances has usually only been undertaken at Steps 4 and 5 during the determination of significance.

1.1.8 The type of location-specific or activity-specific circumstances that have been taken into account include:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors; any conclusions drawn from analysing local meteorological data which

accurately represent the area, and if relevant the season during which the works would take place;

- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any known specific receptor sensitivities beyond the classifications described in the guidance.

Table 1.2: Screening assessment criteria for receptor sensitivity

Sensitivity to Potential Dust Effect	Human Perception of Dust Soiling Effects	PM ₁₀ Health Effects	Ecological Dust Deposition Effects
High sensitivity.	Enjoy a high level of amenity; appearance/aesthetics/ value of property would be diminished by soiling; receptor expected to be present continuously/regularly; eg residential/museums/car showrooms/commercial horticulture.	Public present for 8 hours per day or more, eg residential, schools, car homes.	International/national designation & the designated feature is sensitive to dust soiling effects, e.g. Special Area of Conservation (SAC) for acid heathlands, or lichens, vascular species on Red Data List (Joint Nature Conservation Committee).
Moderate sensitivity.	Enjoy a reasonable level of amenity; appearance/aesthetics/ value of property could be diminished by soiling; receptor not expected to be present continuously/regularly; eg parks/places of work.	Only workforce present (no residential or high sensitivity receptors) 8 hours per day or more.	Important plant species - unknown sensitivity to dust soiling; national designation which may be sensitive, e.g. SSSI with dust sensitive feature.
Low sensitivity.	Enjoyment of amenity not reasonably expected; appearance/aesthetics/ value of property not diminished by soiling; receptors are transient/present for limited period of time; eg playing fields, farmland, footpaths, short-term car parks* & roads - *subject to typical usage, could be high sensitivity.	Transient human exposure, eg footpaths, playing fields, parks.	Local designation where feature may be sensitive to dust soiling, e.g. local nature reserve.

SAC = Special Area of Conservation; JNCC = Joint Committee on Nature Conservation; SSSI = Site of Special Scientific Interest; LNR = Local Nature Reserve

- 1.1.9 The sensitivity of the area is then defined by considering the likely highest sensitivity feature(s), the proximity of receptors to the source (demolition, construction, earthworks and trackout activities), in turn for:
- dust soiling effects on people and property;
 - human health effects of PM₁₀, including consideration of existing ambient concentrations; and
 - ecological effects of dust deposition (physical and chemical effects).
- 1.1.10 The number of receptors is estimated, and assumes that a residential property counts as one receptor.
- 1.1.11 The approach applied in this assessment and summarised in **Table 1.3** to **Table 1.5**, differs from the default examples provided in the IAQM guidance in two respects:
- The adopted approach considers the sensitivity of individual receptors and their proximity to a source of emissions or work site but not the absolute number of properties. This is considered to be a more robust and more conservative approach than the default IAQM method.
 - Distances have been calculated from the nearest boundary of the worksite, if the location of the emissions source is not likely to be fixed throughout the duration of the works. This is considered to be a more conservative approach than the default IAQM method, although it is likely to slightly overstate risks associated with emissions.

Table 1.3: Sensitivity of the area to dust soiling impacts on people and property

Individual Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	1 or more.	High	High	Medium	Low
Moderate	1 or more.	Medium	Low	Low	Low
Low	1 or more.	Low	Low	Low	Low

Table 1.4: Sensitivity of the area to human health impacts

Individual Receptor Sensitivity	Baseline Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	More than 32µg/m ³ .	1 or more.	High	High	High	Medium	Low
High	28 to 32µg/m ³ .	1 or more.	High	High	Medium	Low	Low
High	24 to 28µg/m ³ .	1 or more.	High	Medium	Low	Low	Low
High	More than 24µg/m ³ .	1 or more.	Medium	Low	Low	Low	Low
Moderate	n/a	1 or more.	Low	Low	Low	Low	Low
Low	n/a	1 or more.	Low	Low	Low	Low	Low

Table 1.5: Sensitivity of the area to ecological impacts

Receptor Sensitivity	Distance from the Source (m)		
	Less than 20	Less than 50	50 or more
High	High	Medium	Low
Moderate	Medium	Low	Low
Low	Low	Low	Low

c) Risk of impact definitions

- 1.1.12 At Step 2c, the potential dust emission magnitude of each source and the sensitivity of the area are then combined to establish the likely risk of impacts, based on the assumption of no applied mitigation. Each activity category is considered in turn, using the relationships set out in the risk matrices reported as **Table 1.6** to **Table 1.9**.

Table 1.6: Risk of dust impacts – demolition

Sensitivity of Area	Unmitigated Potential Dust Emission Magnitude		
	Large	Medium	Small
High	High risk.	Medium risk.	Medium risk.
Medium	High risk.	Medium risk.	Low risk.
Low	Medium risk.	Low risk.	Negligible risk.

Table 1.7: Risk of dust impacts – earthworks

Sensitivity of Area	Unmitigated Potential Dust Emission Magnitude		
	Large	Medium	Small
High	High risk.	Medium risk.	Low risk.
Medium	Medium risk.	Medium risk.	Low risk.
Low	Low risk.	Low risk.	Negligible risk.

Table 1.8: Risk of dust impacts – construction

Sensitivity of Area	Unmitigated Potential Dust Emission Magnitude		
	Large	Medium	Small
High	High risk.	Medium risk.	Low risk.
Medium	Medium risk.	Medium risk.	Low risk.
Low	Low risk.	Low risk.	Negligible risk.

Table 1.9: Risk of dust impacts – trackout

Sensitivity of Area.	Unmitigated Potential Dust Emission Magnitude.		
	Large	Medium	Small
High	High risk.	Medium risk.	Low risk.
Medium	Medium risk.	Low risk.	Negligible risk.
Low	Low risk.	Low risk.	Negligible risk.

d) Approach to mitigation

1.1.13 Step 3 identifies appropriate mitigation measures based on the highest level of risk to the area posed by each category of activities (demolition, earthworks, construction, trackout). The level of risk is summarised in a summary table using the template example in **Table 1.10**, with each cell to be filled with 'high/medium/low/negligible risk' relating to the level of risk associated with the activity and impact type.

Table 1.10: Example summary dust risk table.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling.				
Human Health.				
Ecological				

1.1.14 The IAQM (Ref. 1.26) have published recommended packages of mitigation measures that, based on the opinion of the membership of the professional body, represent appropriate measures to be applied to a given combination of activity, and level of potential risk. These measures all have a long history of successful implementation in the UK and most are established good practice measures on any large construction site.

1.1.15 For the Sizewell C Project the measures proposed by IAQM (Ref. 1.26) as ‘*highly recommended for high risk activities*’ have been adopted as embedded mitigation for the main development site and all associated development sites, even if the risk for an activity or location is reported in Step 3 as being moderate or low.

1.1.16 The identified mitigation has been embedded by its inclusion within the **CoCP**.

e) **Determination of significant effects**

1.1.17 Step 4 of the assessment method is to determine whether significant effects on receptors would be likely, with the application of embedded mitigation. This step is undertaken using the professional judgement of the author who is a technically competent individual to undertake the assessment. In determining the significance of likely effects, the following information is taken into account in the findings of the dust risk assessment:

- the location and activity related factors listed at **Table 1.8**; and
- experience of the effectiveness of the proposed measures at other sites.

1.1.18 The final step of the assessment is, where determined as necessary at Step 4, to identify where additional site-specific mitigation measures are required and to assess the significance of the likely residual effects. This is likely to be, for example, as a result of unavoidable coincidence of high-risk activities within the development schedule.

1.1.19 The EIA process has been undertaken in an iterative fashion and potential impacts identified in the preliminary assessments have informed the design and selection of embedded mitigation measures.



VOLUME 1, CHAPTER 6, APPENDIX 6I: LANDSCAPE AND VISUAL LEGISLATION AND METHODOLOGY

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None provided.

1 Landscape and Visual Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant landscape and visual effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites relating to landscape and visual assessment, unless otherwise indicated in the topic chapters of the site assessment volumes in **Volumes 2 to 9** of the **Environmental Statement (ES)**. Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects relating to the landscape and visual assessment of the Sizewell C Project as described in the following **ES** (Doc Ref. Book 6) chapters:

- **Volume 2, Chapter 13** (Doc Ref. 6.3); and
- **Volumes 3 to 9, Chapter 6** (Doc Ref. 6.4–6.10).

1.1.3 The landscape and visual assessments have been informed by proposals and assessments detailed in the following documents:

- Terrestrial Ecology and Ornithology, **Volume 2, Chapter 14** and **Volumes 3 to 9, Chapter 7** of the **ES**;
- Amenity and Recreation, **Volume 2, Chapter 15** and **Volumes 3 to 9, Chapter 8** of the **ES**;
- Terrestrial Historic Environment, **Volume 2, Chapter 16** and **Volumes 3 - 9, Chapter 9** of the **ES**;
- Marine Historic Environment, **Volume 2, Chapter 23** of the **ES**;
- Lighting Management Plan, **Volume 2, Appendix 2B** of the **ES** – relating to the main development site only;
- Tree Survey and Constraints Plan, **Volume 2, Appendix 13I** of the **ES** – relating to the main development site only;
- **Outline Landscape and Ecological Management Plan** (Doc Ref. 8.2) – relating to the main development site only;

- Description of Construction, **Volume 2, Chapter 3** of the **ES** – relating to the main development site only; and
- **Code of Construction Practice** (Doc Ref. 8.11).

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant landscape and visual effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the landscape and visual assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. The European Landscape Convention 2000

1.2.3 The European Landscape Convention 2000 (Ref 1.1) promotes the need to take account of all landscapes, with less emphasis on the special and more recognition that ordinary landscapes also have their value. The European Landscape Convention defines landscape as *“an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”*. The Landscape and Visual Assessment chapters provided in **Volumes 2 to 9** of the **ES** consider effects on all landscape, not just designated landscapes.

b) National

i. Legislation

The Countryside and Rights of Way Act 2000

1.2.4 The Countryside and Rights of Way (CRoW) Act 2000 (Ref 1.2) provides for public access on foot to certain types of land, amends the law relating to public rights of way, and provides for better management of areas of outstanding natural beauty (AONB).

1.2.5 The CRoW Act clarifies the procedure and purpose of designating AONBs and consolidates the provisions of previous legislation. The CRoW Act also requires all relevant authorities to have regard to the purpose of conserving and enhancing the natural beauty of AONBs when performing their functions.

The assessment of landscape and visual effects presented within this **ES** considers the effects of the Sizewell C Project on the purposes of the Suffolk Coast and Heaths AONB.

ii. Policy

National Policy Statements 2011

- 1.2.6** The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref 1.3) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref 1.4). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.7** The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.8** A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1** and **Table 1.2**.

Table 1.1: Requirements of the National Policy Statement for Energy (EN-1).

Ref.	NPS Topic Requirement	How the Requirement Has Been Addressed
Part 4 'Assessment Principles'.	Application of " <i>good design</i> " to produce sustainable infrastructure sensitive to place, matched by an appearance that demonstrates good aesthetic as far as possible.	The assessment and design of the proposed development has been an iterative process. The application of design principles (as set out in the Design and Access Statement (Doc Ref. 8.1) for the main development site and the Associated Development Design Principles document (Doc Ref. 8.3) submitted with the DCO application) and measures adopted to deliver good design are recorded in the Landscape and Visual Assessment chapters of Volumes 2 to 9 of the ES .
5.6.4	<i>"The applicant should assess the potential for ... artificial light to have a detrimental impact on amenity, as part of the Environmental Statement."</i>	The Landscape and Visual Assessment chapters of Volumes 2 to 9 of the ES contain a night-time appraisal as an appendix, where relevant, to consider

Ref.	NPS Topic Requirement	How the Requirement Has Been Addressed
		the effects of proposed artificial light during both construction and operation.
5.9.1	<i>“references to landscape should be taken as covering seascape and townscape where appropriate.”</i>	The Landscape and Visual Assessment chapter for Volume 2 of the ES , main development site, includes an assessment of the effects of the proposed main development site on seascape character. No townscape is directly affected by the Sizewell C Project.
5.9.5	<i>“The applicant should carry out a landscape and visual assessment and report it in the ES.”</i>	The Landscape and Visual Assessment chapters of Volumes 2 to 9 of the ES assess landscape and visual effects during construction and operation. They refer to published character assessments and associated studies/policies.
5.9.6	<i>“The applicant’s assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and landscape character.”</i>	
5.9.8	<i>“Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate.”</i>	The assessment and design of the Sizewell C Project has been an iterative process. The application of design principles set out in the Design and Access Statement for the main development site (Doc Ref. 8.1) and the Associated Development Design Principles document submitted with the DCO application (Doc Ref. 8.3) and measures adopted to deliver good design are recorded in the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .
5.9.9	<i>“... AONBs have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection.”</i>	The Suffolk Coast and Heaths AONB has been an important consideration throughout the assessment and design process. SZC Co. has liaised with the AONB Partnership to agree the AONB’s natural beauty and special qualities, as set out in the Natural Beauty and Special Quality Indicators document (Ref. 1.5) available through the Suffolk Coast and Heaths website, which form the basis of the assessment of effects on the AONB within the Landscape and Visual Assessment chapters of Volumes 2 to 9 of the ES .
5.9.12	<i>“The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various</i>	

Ref.	NPS Topic Requirement	How the Requirement Has Been Addressed
	<i>siting, operational, and other relevant constraints.”</i>	
5.9.14	<i>"Outside nationally designated areas, there are local landscapes that may be highly valued locally and protected by local designation. Where a local development document in England... has policies based on landscape character assessment, these should be paid particular attention. However, local landscape designations should not be used in themselves to refuse consent, as this may unduly restrict acceptable development"</i>	Effects on locally designated landscapes (special landscape areas) are considered as part of the Landscape and Visual Assessment chapters, as well as effects on landscape character based on consideration of local landscape character assessments in Volumes 2 to 9 of the ES .
5.9.17	<i>"The IPC should consider whether the project has been designed carefully, taking account of environmental effects on the landscape and siting, operational and other relevant constraints, to minimise harm to the landscape, including by reasonable mitigation.”</i>	Effects on landscape character are considered as part of the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .
5.9.18	<i>"All proposed energy infrastructure is likely to have visual effects for many receptors around proposed sites. The IPC will have to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the project. Coastal areas are particularly vulnerable to visual intrusion because of the potential high visibility of development on the foreshore, on the skyline and affecting views along stretches of undeveloped coast.”</i>	The visual effects of the Sizewell C Project are considered as part of the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .
5.9.20	<i>"The IPC should ensure applicants have taken into account the landscape and visual impacts of visible plumes from chimney stacks and/or the cooling assembly.”</i>	
5.9.21	<i>"Reducing the scale of a project can help to mitigate the visual and landscape effects of a proposed project.”</i>	The assessment and design of the Sizewell C Project has been an iterative process. Measures to mitigate landscape and visual effects are presented in the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .

Table 1.2: Requirements of the National Policy Statement for Nuclear Power Generation (EN-6).

Ref.	NPS Topic Requirement	How the Requirement Has Been Addressed
3.10.8	<i>“Mitigation should, however, be designed to reduce the visual intrusion of the project as far as reasonably practicable.”</i>	The assessment and design of the Sizewell C Project has been an iterative process. Measures to mitigate landscape and visual effects including the siting of infrastructure, design of buildings and selection of colours and materials are presented in the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .
C.8.85	The IPC should “refer to relevant guidance in EN-1 and part 3 of NPS EN-6”; the Appraisal of Sustainability; and the applicant’s proposals and “consider whether the applicant’s proposals sufficiently avoid or mitigate potential impacts where they are still relevant”.	The assessment and design of the Sizewell C Project has been an iterative process. Measures to mitigate landscape and visual effects including the siting of infrastructure, design of buildings and selection of colours and materials are summarised in the Landscape and Visual Assessment chapters in Volumes 2 to 9 of the ES .
C.8.86	With regard to transmission infrastructure, “a detailed environmental assessment should be made by the applicant at the IPC stage”.	Volume 2, Chapter 13 of the ES , the Landscape and Visual Assessment chapter for the main development site, considers the landscape and visual effects of proposed transmission infrastructure.

UK Marine Policy Statement 2011

1.2.9 The UK Marine Policy Statement (Ref 1.6) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It was prepared and adopted for the purposes of section 44 of the Marine and Coastal Access Act 2009 (Ref 1.7). Section 2.6.5 specifically addresses ‘Seascape’.

1.2.10 It records (paragraph 2.6.5.1) that “*The effects of activities and developments in the marine and coastal area on the landscape, including seascape, will vary on a case-by-case basis according to the type of activity, its location and its setting.*” It adds that there is no legal definition of seascape, but refers to the European Landscape Convention (Ref 1.1) definition of landscape. It adds that “*In the context of this document, references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other.*”

1.2.11 Paragraph 2.6.5.2 adds:

“... any wider social and economic impacts of a development or activity on coastal landscapes and seascapes should be considered.”

1.2.12 It also indicates that consideration of effects of development on seascape should take account of existing character and quality, how highly it is valued and its capacity to accommodate change. Regard should also be given to the statutory purposes of any nearby nationally designated areas.

1.2.13 Effects on seascape character can only arise from the main development site, as considered in **Volume 2, Chapter 13** of the **ES**.

National Planning Policy Framework 2019

1.2.14 The National Planning Policy Framework (NPPF) (Ref 1.8) sets out the Government’s planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.15 Section 2 makes clear the objective is to contribute to sustainable development, and that design (Section 12), and effects on the natural environment (Section 15) are important components of this.

1.2.16 Paragraph 11 identifies areas of particular importance that could provide a strong reason for restricting development. The areas or assets of particular importance in respect of landscape and visual matters are:

- AONB;
- national parks; and
- heritage coasts.

1.2.17 In Section 12, “*Achieving well-designed places*”, paragraph 127 of the NPPF indicates that developments should function well and add to the overall quality of the area; be visually attractive; be sympathetic to local character and maintain a strong sense of place.

1.2.18 Section 15 of the NPPF relates to “*Conserving and enhancing the natural environment*.” Paragraph 170 identifies ways to contribute and enhance the natural and local environment, including:

- “protecting and enhancing valued landscapes”;
- “recognising the intrinsic character and beauty of the countryside”; and
- “maintaining the character of the undeveloped coast, while improving public access to it where appropriate.”

1.2.19 In respect of valued landscapes, paragraph 171 notes that plans should “*distinguish between the hierarchy of international, national and locally designated sites.*” Paragraphs 172 and 173 require that “*Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to these issues*” and that “*Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character.*”

1.2.20 Paragraph 180 requires that “*...new development is appropriate for its location*” including by limiting the impact of light pollution from artificial light on local amenity and intrinsically dark landscapes.

1.2.21 The Landscape and Visual chapters in **Volumes 2 to 9** of the **ES** consider the effects of the Sizewell C Project on: the purposes of the Suffolk Coast and Heaths AONB; the character of the surrounding landscape; and other designated landscapes.

1.2.22 The hierarchy of landscape designations has informed the criteria for assessing landscape value, a component of landscape sensitivity within the landscape and visual assessments. The value of individual landscapes is also considered as part of the baseline section of the landscape and visual chapters in **Volumes 2 to 9** of the **ES**. Where elements of the Sizewell C Project include lighting, the landscape and visual chapters include an assessment of night-time effects as an appendix and summarised in the main text.

iii. Planning Practice Guidance

1.2.23 The Planning Practice Guidance (Ref 1.9, 1.10 and 1.11) is a web-resource to support the NPPF (Ref 1.8). It includes guidance relating to numerous topics, with sections relevant to landscape and visual matters including the Natural Environment, Design and Light Pollution. The key aspects of these section relevant to the landscape and visual assessment are summarised below.

Natural Environment 2019

- 1.2.24 The Natural Environment section (Ref 1.9) explains the key issues in implementing policy to protect biodiversity, but also contains a section on landscape. This section reiterates policy within the NPPF and highlights the importance of identifying the special characteristics of locally valued landscapes.
- 1.2.25 With regards to national parks, the broads and AONBs, the guidance states that:
- “Section 11A(2) of the National Parks and Access to the Countryside Act 1949, section 17A of the Norfolk and Suffolk Broads Act 1988 and section 85 of the Countryside and Rights of Way Act 2000 require that ‘in exercising or performing any functions in relation to, or so as to affect, land’ in National Parks and Areas of Outstanding Natural Beauty, relevant authorities ‘shall have regard’ to their purposes for which these areas are designated”* (para 039). The same paragraph also requires consideration of the effects of development on the setting of AONBs.
- 1.2.26 The guidance also highlights that Natural England has published advice on heritage coasts. This guidance indicates that heritage coasts are *“managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors”* (paragraph 043).
- 1.2.27 This document also provides guidance on green infrastructure, highlighting types of green infrastructure (paragraph 004) and the benefits which they provide (paragraph 005), including achieving well-designed places as *“green infrastructure exists within a wider landscape context and can reinforce and enhance local landscape character, contributing to a sense of place and natural beauty”* (paragraph 006).
- 1.2.28 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** consider the effects of Sizewell C Project on the purposes of the Suffolk Coast and Heaths AONB, Heritage Coast and landscape character where appropriate.

Design: process and tools 2019

- 1.2.29 The Design: Process and Tools section of the Planning Practice Guidance (Ref 1.10) sets out principles in respect to the design of a development, noting that:
- “permission should be refused for development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions, taking into account any local design standards or style guides in plans or supplementary planning documents. Conversely,*

where the design of a development accords with clear expectations in plan policies, design should not be used by the decision-maker as a valid reason to object to development.”

- 1.2.30 Consideration is given to the design of the Sizewell C Project in the Landscape and Visual chapters, where relevant, to effects on landscape character, visual effects and effects on the purposes and special qualities of designated landscapes, as discussed in **Volumes 2 to 9** of the **ES**. Reference is also made to the **Design and Access Statement** for the main development site (Doc Ref. 8.1) and the **Associated Development Design Principles** document submitted with the DCO application (Doc Ref. 8.3) where appropriate.

Light Pollution 2019

- 1.2.31 The Light Pollution section of the Planning Practice Guidance (Ref 1.11) sets out the circumstances in which light pollution can become relevant to planning, stating *“artificial light is not always necessary. It has the potential to become what is termed ‘light pollution’ or ‘obtrusive light’, and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or the night sky, especially in areas with intrinsically dark landscapes. Intrinsically dark landscapes are those entirely, or largely, uninterrupted by artificial light. National parks and nature reserves can serve as good examples, particularly where they support habitats for native nocturnal animals”* (paragraph 001).

- 1.2.32 The guidance continues at paragraph 003:

“Light intrusion occurs when the light ‘spills’ beyond the boundary of the area being lit. For example, light spill can result in safety impacts related to the impairment or distraction of people (e.g. when driving vehicles), health impacts arising from impaired sleep, cause annoyance to people, compromise an existing dark landscape and/or adversely affect natural systems (e.g. plants, animals, insects, aquatic life). These adverse effects can usually be completely avoided with careful lamp and luminaire selection and positioning:

Lighting near or above the horizontal is usually to be avoided to reduce glare and sky glow (the brightening of the night sky).

Good design, correct installation and ongoing maintenance are essential to the optical effectiveness of lighting schemes such as fixed and/or regularly operated functional and decorative lighting elements.”

- 1.2.33 Paragraph 005 adds *“Consideration of how much light shines may include an assessment of the quantitative and spectral attributes of the lighting scheme (e.g. light source and performance levels) and whether it exceeds*

the levels required to fulfil its intended purpose. Consideration can also be given to whether the proposed lighting is purely for decorative purposes as opposed to being needed for functional reasons such as security. The character of the area and the surrounding environment may affect what will be considered an appropriate level of lighting for a development. In particular, lighting schemes for developments in protected areas of dark sky or intrinsically dark landscapes should be carefully assessed as to their necessity and degree.”

- 1.2.34 Where the Sizewell C Project proposes lighting, the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include an assessment of night-time effects as an appendix and is summarised in the main text.

iv. Government’s 25 Year Environment Plan 2018

- 1.2.35 The 25 Year Environment Plan (Ref 1.12) sets out the Government’s long-term approach to protecting and enhancing the environment. Amongst its 25 year goals, the plan seeks to achieve *“Enhanced beauty, heritage and engagement with the natural environment.”*
- 1.2.36 The plan records that action will be taken on a number of fronts and identifies six key areas around which action will be focused. One of the goals of the plan is to *“...conserve and enhance the beauty of our natural environment, and make sure it can be enjoyed, used by and cared for by everyone...”* It adds that this goal will be achieved by *“Safeguarding and enhancing the beauty of our natural scenery and improving its environmental value while being sensitive to considerations of its heritage.”*
- 1.2.37 Policies that are particularly relevant to the landscape and visual chapters are contained in Chapter 1, Using and Managing Land Sustainably, and Chapter 2, Recovering Nature and Enhancing the Beauty of Landscapes. With regards to conserving and enhancing natural beauty, the plan records that the Government will identify opportunities for environmental enhancement in all of England’s national character areas to improve landscapes for people, places and nature.
- 1.2.38 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** consider both the visual effects of the Sizewell C Project and the effects on the character of the surrounding landscape, with reference to national character areas. The chapters in **Volumes 2 to 9** of the **ES** also consider the effects of the Sizewell C Project on the purposes of the Suffolk Coast and Heaths AONB.

c) Regional

i. East Inshore and East Offshore Marine Plans 2014

1.2.39 Marine plans, together with the Marine Policy Statement, underpin the planning system for England's seas. The East Inshore and East Offshore Marine Plans (Ref 1.13) provide an approach to managing those areas, their resources, and the activities and interactions that take place within them.

1.2.40 The plans present several objectives, including Objective 5 which is *"To conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area."* The supporting text for this objective indicates:

"This objective relates to the historic environment, nationally important landscapes and seascapes. It recognises the need to consider if developments are appropriate to the area they would be located in and have influence upon, and as far as possible do not compromise the value of such assets and characteristics" (paragraph 70).

1.2.41 With reference to nationally designated areas, the plans signpost to existing policy and measures in the UK Marine Policy Statement (Paras. 157 and 158). With reference to seascape and the visual resource the plans signpost to NPS EN-1 (Ref. 1.3).

1.2.42 With reference to character, Policy SOC3 of the East Inshore and East Offshore Marine Plans states:

"Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference:

a) that they will not adversely impact the terrestrial and marine character of an area

b) how, if there are adverse impacts on the terrestrial and marine character of an area, they will minimise them

c) how, where these adverse impacts on the terrestrial and marine character of an area cannot be minimised they will be mitigated against

d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts."

1.2.43 It records (paragraph 176) that Policy SOC3 adds value to what is described in the Marine Policy Statement by ensuring that the character of specific areas is considered not only in the development of marine plans, but also in all decisions, such as on proposals for development, activities or management measures. It adds that decisions should aim to minimise or

mitigate possible detrimental effects within the East Offshore Marine Plan areas.

- 1.2.44 Effects of the proposed main development site on landscape and seascape character, as well as the purposes of the Suffolk Coast and Heaths AONB, are considered in **Volume 2, Chapter 13** of the **ES**.

d) Local

- 1.2.45 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.46 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

- 1.2.47 The adopted Suffolk Coastal Local Plan comprises: the Core Strategy and Development Policies Development Plan Document (2013) (Ref 1.14); the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref 1.15); and the 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006) (Ref 1.16).

- 1.2.48 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref 1.17) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies 2013

- 1.2.49 The Core Strategy and Development Management Policies (Ref 1.14) form part of the Suffolk Coastal Development Plan and set out the strategic vision for the district. Chapter 3 of the Core Strategy sets out strategic policies. The following policies are relevant to the Landscape and Visual chapters.

- 1.2.50 Strategic Policy SP1 – Sustainable Development records that the Strategy will be to:

“(e) give priority to re-using previously developed land and buildings in and around built-up areas, where possible ahead of greenfield sites;
...(j) conserve and enhance the areas natural historic and built environment;

...(k) maintain and enhance sense of place; ...”

1.2.51 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** consider the effects of the Sizewell C Project on the character of the surrounding landscape.

1.2.52 Strategic Policy SP13 – Nuclear Energy relates specifically to the possibility of additional nuclear power stations at Sizewell and the need to consider:

“...(a) Proposed layout and design; ...

...(c) Landscape and visual character assessment including cumulative effects; ...”

1.2.53 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** consider both the visual effects of the Sizewell C Project and the effects on the character of the surrounding landscape. Cumulative effects are considered separately in **Volume 10** of the **ES** (Doc Ref. 6.11).

1.2.54 Strategic Policy SP14 – Biodiversity and Geodiversity states biodiversity and geodiversity will be protected and enhanced using a framework that is based on a network of:

“Designated sites;

Wildlife corridors and links;

The rivers, estuaries and coast;

Identified habitats and geodiversity features;

Landscape character areas; and

Protected species.”

1.2.55 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** consider the effects of the Sizewell C Project on the local landscape character of the surrounding landscape.

1.2.56 Strategic Policy SP15 – Landscape and Townscape states:

“The policy of the Council will be to protect and enhance the various landscape character areas within the district either through opportunities linked to development or through other strategies.”

1.2.57 It adds:

“In addition to the protected landscape of the AONB, the valleys and tributaries of the Rivers Alde, Blyth, Deben, Fynn, Hundred, Mill, Minsmere, Ore, Orwell and Yox, and the designated Parks and Gardens

of Historic or Landscape Interest are considered to be particularly significant.

Many of the towns and villages in the district are of distinctive historical and architectural value, as well as landscape value and character, and the Council will seek to enhance and preserve these attributes and the quality of life in the generality of urban areas.”

- 1.2.58 Strategic Policy SP15 does not specially mention special landscape areas (a remaining saved policy). However, the preamble (paragraph 3.154) highlights their importance at a county scale.
- 1.2.59 Effects of the Sizewell C Project on special landscape areas, as well as the purposes of the Suffolk Coast and Heaths AONB and where relevant parks and gardens of historic or landscape interest, are considered in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.
- 1.2.60 Chapter 5 of the Core Strategy sets out a suite of development management policies.
- 1.2.61 Development Management Policy DM21 – Design: Aesthetics states
- “Proposals that comprise poor visual design and layout, or otherwise seriously detract from the character of their surroundings will not be permitted.”*
- 1.2.62 It identifies specific criteria in relation to design, including:
- “(a) proposals should relate well to the scale and character of their surroundings particularly in terms of their siting, height, massing and form; ...*
- (e) layouts should incorporate and protect existing site features of landscape, ecological, heritage or amenity value as well as enhance such features e.g. habitat creation*
- (f) attention must be given to the form, scale, use, and landscape of the spaces between buildings and the boundary treatment of individual sites, particularly on the edge of settlements.”*
- 1.2.63 Effects of the Sizewell C Project on the physical fabric of the sites, as well as visual effects and effects on landscape character, are considered in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.
- 1.2.64 Development Management Policy DM23 – Residential Amenity highlights that the *“planning system plays an important role in safeguarding the quality of life of the residents of the district”* (paragraph. 5.58). The policy states that *“Development will be acceptable where it would not cause an unacceptable*

loss of amenity to adjoining or future occupiers of the development” and indicates that “light spillage, air quality and other forms of pollution” are some of the factors that the Council will have regard to.

1.2.65 Development Management Policy DM26 – Lighting states:

“The District Council will seek to minimise light pollution. Applications for development requiring or likely to require external lighting should include details of lighting schemes. This should include position, height, aiming points, lighting levels and a polar luminance diagram. Applicants will need to satisfy the District Council that:

- (a) The proposed lighting scheme is the minimum needed for security, working purposes, recreational or other use of the land;*
- (b) It is designed so as to minimise pollution from glare and light spillage, particularly to residential and commercial areas, areas of nature conservation importance, and areas whose open and landscape qualities would be affected; and*
- (c) There will be no glare or light spillage onto highways which could dazzle, distract or disorientate road users using them.”*

1.2.66 It adds:

“In order to prevent unnecessary intrusion into the countryside, or the effect on residential amenity, the District Council may seek to control the days and times of use of lighting (excluding street lighting).”

1.2.67 In relation to policies DM23 and DM26, where the Sizewell C Project includes lighting, the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include an appendix that assesses night-time effects.

ii. [Suffolk Coastal District Council Site Allocations and Area Specific Policies – Development Plan Document 2017](#)

1.2.68 The Site Allocations and Area Specific Policies document (Ref 1.15) also forms part of the Suffolk Coastal Development Plan. Policies relevant to the landscape and visual assessment are summarised below.

1.2.69 Policy SSP37 – Parks and Gardens of Historic or Landscape Interest identifies a number of historic parklands in addition to the six in the district that are included in the National Register of Parks and Gardens of Special Historic Interest. The policy encourages “...the preservation and or enhancement of these parks and gardens of historic interest and their surroundings.” It states:

“Applications for planning permission will be permitted where the development proposal will not have a materially adverse impact on the character, features or immediate setting of the delineated park or garden and which have due regard to the additional advice and guidance in Supplementary Planning Guidance SPG6 (as updated).”

1.2.70 Effects of the Sizewell C Project on the parks and gardens of historic or landscape interest, where relevant from a landscape and visual perspective, are considered in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.

1.2.71 Policy SSP38 – Special Landscape Areas applies to those areas within Suffolk *“...with special landscape attributes which are particularly vulnerable to change. They include some river valleys which still possess traditional grazing meadows and marshes with their hedgerows, dykes and associated flora and fauna and Historic Parklands”* (Paragraph. 7.20).

1.2.72 The policy states:

“Development will not be permitted in these areas where it would have a material adverse impact on the qualities of the landscape that make it special.”

1.2.73 Effects of the Sizewell C Project on special landscape areas are considered in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.

iii. **Suffolk Coastal Local Plan (Remaining Saved Policies) 2001 and 2006**

1.2.74 A small number of policies from the Suffolk Coastal Local Plan (incorporating the First and Second Alterations) (Ref 1.16) remain part of the Development Plan for Suffolk Coastal District/East Suffolk Council. These should be read alongside the other Development Plan documents until replaced by updated policy. One saved policy (Policy AP122) is of relevance to the landscape and visual assessment.

1.2.75 Policy AP122 – Sizewell Gap applies to the area illustrated on the Proposals Map (July 2017) that includes Sizewell village, car park, café and beach. It states:

“The District Council will seek to improve and enhance the appearance of the Sizewell Gap area, as shown on the Proposals Map, for the benefit of residents and tourists.”

1.2.76 The assessment of landscape and visual effects for the proposed main development site within **Volume 2, Chapter 13** of the **ES** includes consideration of effects on the Sizewell Gap area.

iv. Suffolk Coastal District Council Final Draft Local Plan 2019

- 1.2.77 The following policies contained within the Final Draft Local Plan (Ref 1.17) are relevant to the landscape and visual chapters.
- 1.2.78 Draft Policy SCLP3.4 – Proposals for Major Energy Infrastructure Projects states that *“Proposals for Major Infrastructure Projects across the District and the need to mitigate the impacts arising from these will be considered against the following policy requirements:*
- ...f) Requirement for robust assessment of the potential impacts on the Suffolk Coast and Heaths Area of Outstanding Natural Beauty;...”*
- 1.2.79 Effects of the Sizewell C Project on the purposes of the Suffolk Coast and Heaths AONB are considered in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.
- 1.2.80 Other draft policies of particular relevance to the landscape and visual assessments are contained in Section 10 (Natural Environment) and 11 (Built and Historic Environment).
- 1.2.81 Draft Policy SCLP10.3 – Environmental Quality states that *“Development proposals will be expected to protect the quality of the environment and to minimise and, where possible, reduce all forms of pollution and contamination.”* It adds that *“Development proposals will be considered in relation to impacts on ... e) Light pollution;...”* and that *“Proposals should seek to secure improvements in relation to the above where possible.”* Where the Sizewell C Project includes lighting, the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include an assessment of night-time effects as an appendix.
- 1.2.82 Draft Policy SCLP10.4 – Landscape Character requires proposals for development to be informed by relevant local landscape character assessment. For the landscape and visual chapters of **Volumes 2 to 9** of the **ES**, the basis for the assessment of effects on landscape character has been agreed through consultation, as indicated in **Table 6E.2** of **Appendix 6E** of this volume of the **ES**.
- 1.2.83 Draft Policy SCLP10.4 continues:
- “Development proposals will be expected to demonstrate their location, scale, form, design and materials will protect and enhance:*
- a) The special qualities and features of the area;*
- b) The visual relationship and environment around settlements and their landscape settings;*

- c) *Distinctive landscape elements including but not limited to watercourses, commons, woodland trees, hedgerows and field boundaries, and their function as ecological corridors;*
- d) *Visually sensitive skylines, seascapes, river valleys and significant views towards key landscapes and cultural features; and*
- e) *The growing network of green infrastructure supporting health, wellbeing and social interaction.”*

1.2.84 Other considerations contained within draft Policy SCLP10.4 include avoiding significant adverse impacts on features such as rural river valleys, historic park and gardens, and other very sensitive landscapes; conserving and enhancing the landscape and scenic beauty of the AONB; ensuring development is well integrated into the landscape and enhance connectivity to the surrounding green infrastructure and Public Rights of Way network, informed by landscape and visual impact assessment and landscape mitigation; and protecting dark skies across the district. The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include assessment of the effects of the Sizewell C Project on the physical fabric of the sites, as well as visual effects, effects on landscape character, and effects on the purposes of designated landscapes.

1.2.85 Draft Policy SCLP11.1 – Design Quality states “*The Council will support locally distinctive and high quality design that clearly demonstrates an understanding of the key features of local character and seeks to enhance these features through innovative and creative means.*”

1.2.86 It adds that “*In doing so, permission will be granted where proposals:*

...b) Demonstrate a clear understanding of the character of the built, historic and natural environment and use this understanding to complement local character and distinctiveness through both robust evidence, informed sources and site specific context and analysis;

c) Respond to local context and the form of surrounding buildings in relation to the following criteria:

i. the overall scale and character should clearly demonstrate consideration of the component parts of the buildings and the development as a whole in relation to its surroundings;

ii. the layout should fit in well with the existing neighbourhood layout and respond to the ways people and vehicles move around both internal and external to existing and proposed buildings;

iii. the height and massing of developments should be well related to that of their surroundings;

iv. the relationship between buildings and spaces and the wider street scene or townscape; and

v. by making use of high quality materials appropriate to the local context;

d) Take account of any important landscape or topographical features and retain and/or enhance existing landscaping and natural and semi-natural features on site;...

....i) Include hard and soft landscaping schemes to aid the integration of the development into its surroundings;..."

1.2.87 The Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include consideration of the context to the sites, as well as assessment of the effects of the Sizewell C Project on the physical fabric of the sites, visual effects and effects on landscape character.

1.2.88 Draft Policy SCLP11.2 – Residential Amenity states:

"When considering the impact of development on residential amenity, the Council will have regard to the following:

a) Privacy/overlooking;

b) Outlook;

c) Access to daylight and sunlight; ...

f) Light spillage; ...

Development will not cause an unacceptable loss of amenity to neighbouring or future occupiers of development in the vicinity."

1.2.89 The preamble to the policy records that *"Harmful effects can include those arising from overlooking, loss of privacy, noise, odour and light pollution and overbearing development. Residential amenity can be affected by individual developments or, as a result of cumulative impacts"* (Paragraph 11.7). Where the Sizewell C Project includes lighting, the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** include an assessment of night-time effects as an appendix.

e) Guidance

1.2.90 The Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES** have been undertaken in accordance with the following documents:

- Suffolk Coast and Heaths Area of Outstanding Natural Beauty Management Plan 2018–2023 (Ref 1.18)

- This document highlights that relevant authorities will pay regard to the purposes of the AONB and provides the framework for the coordination of action from partnership organisations and others whose activities impact upon the AONB. It sets out the objectives, vision and management themes and objectives for the AONB. The document informs the Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES**, as well as providing context for the assessment of effects on the purposes and special qualities of the AONB.
- Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) Natural Beauty and Special Quality Indicators 2016 (Ref 1.5)
 - This document sets out the Natural Beauty and Special Qualities of the AONB. The document has been developed by SZC Co., as part of their preparatory work for the Sizewell C Project, in consultation and agreement with the AONB Partnership, Suffolk Coastal District Council¹ and Suffolk County Council. The document informs the Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES**, as well as providing context for the assessment of effects on the purposes and special qualities of the AONB.
- Suffolk Coast and Heaths Area of Outstanding Natural Beauty Position Statement – Sizewell C Design Principles: The Local Perspective 2013 (Ref 1.19)
 - Suffolk County Council and Suffolk Coastal District Council in collaboration and discussion with National Trust, Royal Society for the Protection of Birds (RSPB), Suffolk Wildlife Trust and the Suffolk Coast & Heaths AONB have set out a series of design principles specific to the Sizewell C Project. The focus is on design and delivery of the nuclear power station itself within the AONB. However, the design principles are equally applicable to associated development within the wider landscape. The assessment and design of the Sizewell C Project has been an iterative process. The application of design principles and measures adopted to deliver good design are recorded in the Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES**.

¹ On 1st April 2019, Suffolk Coastal District Council (SCDC) merged with Waveney District Council, forming the East Suffolk Council. Where consultation with the local authority was undertaken prior to this date, this was carried out with SCDC and therefore, reference to SCDC has been made within this document.

- Suffolk Coast and Heaths AONB Position Statement – Obtrusive Lighting in the Suffolk Coast and Heaths Area of Outstanding Natural Beauty 2016 (Ref 1.20)
 - The position statement, endorsed by the Suffolk Coast & Heaths AONB Partnership, provides guidance to local planning authorities, landowners and other interested parties regarding lighting in the Suffolk Coast & Heaths AONB. The Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES** include an appendix (Night-time appraisal) that considers the effects of proposed artificial light during both construction and operation.
- Suffolk Coast and Heaths AONB Partnership Position Statement – Development in the Setting of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty 2015 (AONB) (Ref 1.21)
 - This document records that the AONB Partnership considers “...*the setting, including the views into and out of the AONB, to be the area within which development and land management proposals, by virtue of their nature; size; scale; siting, materials or design can be considered to have an impact, positive or negative, on the natural beauty and special qualities of the nationally designated landscape.*” The landscape and visual chapters of **Volumes 2 to 9** of the **ES** consider the effects of the Sizewell C Project on the purposes of the Suffolk Coast and Heaths AONB, as well as its setting.
- Suffolk Coast and Heaths AONB Partnership Position Statement – Landscape and Management of the Coast 2010 (Ref 1.22)
 - This document records that the interface between land and sea contributes to the special character of the area and is a key part of the area’s designation as an AONB. It goes on to record the importance of landscape and sets out the AONB Partnership’s view on related topics. The Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES** consider the effects of the Sizewell C Project on landscape, seascape and the purposes and special qualities of the AONB as relevant to each chapter.
- Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) Guidance on the Selection and Use of Colour in Development 2018 (Ref 1.23)
 - This document provides guidance on the selection and use of colour for development within the AONB, which including

industrial premises and office buildings, along with infrastructure development including associated with power generation. The assessment and design of the Sizewell C Project has been an iterative process. Measures to mitigate landscape and visual effects including the siting of infrastructure, design of buildings and selection of colours and materials are presented in the Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES**.

- National Character Area Profiles (NCA Profile 82 Suffolk Coast and Heaths 2015 (Ref 1.24) and NCA Profile 83 South Norfolk and High Suffolk Claylands 2014 (Ref 1.25))
 - The National Character Area Profiles are guidance documents which can help support the planning of conservation initiatives at a landscape scale and help to inform choices about how land is managed and can change. Each profile includes a description of the natural and cultural features and how the landscape has changed over time. This information informs the understanding of the baseline landscape character within each Landscape and Visual Assessment chapter of **Volumes 2 to 9** of the **ES**. However, given the scale of the NCAs, and the presence of more detailed character areas at a local level, effects on NCAs are not assessed in detail in the Landscape and Visual Assessment chapters, as agreed with relevant landscape and visual consultees provided in **Table 1.3**.
- East of England Regional Landscape Typology 2011 (Ref 1.26)
 - This assessment identifies, at a regional scale, the types of landscape that occur within the study areas for each Landscape and Visual Assessment chapter of **Volumes 2 to 9** of the **ES**. The landscape character types broadly correspond with those identified in the Suffolk Landscape Character Assessment, but there is greater subdivision in the County assessment. Given the greater detail in the County assessment, this information informs the understanding of the baseline landscape character within each Landscape and Visual Assessment chapter, effects on regional landscape character types are not assessed in detail, as agreed with relevant landscape and visual consultees provided in **Table 1.3**.
- Suffolk Landscape Character Assessment 2008, revised 2011 (Ref 1.27)

- Published by Suffolk County Council, the Suffolk Landscape Character Assessment describes the character and qualities of distinct landscape character types (LCTs) across the county. As agreed with relevant landscape and visual consultees provided in **Table 1.3**, this assessment forms the basis of the assessment of effects on landscape character. In addition to presenting a description of landscape character, the Suffolk Landscape Character Assessment includes Guidance Notes which present a description of landscape sensitivity and key forces for change along with guidelines for development management and land. This guidance is considered where relevant within the Landscape and Visual Assessment chapters of **Volumes 2 to 9** of the **ES**.
- Suffolk Historic Landscape Characterisation 2012 (Ref 1.28)
 - This document identifies Historic Landscape Types based on current land use and an assessment of its historical origin. The assessment provides both a historical context to descriptions of the Suffolk landscape, and a means to enhance understanding and management of historic landscapes. The results contributed to the Suffolk Landscape Character Assessment and inform the baseline within the Landscape and Visual Assessment chapters as relevant.
- Suffolk Coastal District Council Supplementary Planning Guidance 6 Historic Parks and Gardens 1995 (Ref 1.29)
 - This document identifies parklands of District-Wide significance that meet a series of criteria. These parklands do not appear on the national Register of Parks and Gardens but are considered important at the local level. The guidance defines the key features and extent of each parkland. The guidance is relatively old and is due to be updated. However, in the meantime it informs the landscape character baseline in the Landscape and Visual Assessment chapters as relevant.
- Suffolk Coastal Landscape Character Assessment 2018 (Ref 1.30)
 - The Suffolk Coastal Landscape Character Assessment forms part of the evidence base for the draft Suffolk Coastal Local Plan (January 2019). It has been agreed with relevant landscape and visual assessment consultees, provided in **Table 1.3**, that the Suffolk County assessment will be used as the basis for assessment, as it is in the public domain and has been subject to consultation. Reference is made to the Suffolk Coastal Landscape

Character Assessment where relevant within the Landscape and Visual Assessment chapters.

- Special Landscape Areas Paper 2016 (Ref 1.31)
 - This document forms the basis of agreement with the relevant landscape and visual consultees as to the purposes and ‘special landscape quality indicators’ for the special landscape areas, as discussed in **Table 1.3**. The effects of the Sizewell C Project on the purposes of the special landscape areas designation recorded in the Paper are assessed in the Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The generic Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 This section provides a summary of the landscape and visual assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific additions to the methodology for the landscape and visual assessment are described within the relevant site-specific volumes of this **ES**.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA scoping opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5 The Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd edition, 2013 (Ref 1.32) state: *“Landscape and Visual Impact Assessment is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and people’s views and visual amenity”* (Paragraph 1.1). Paragraphs 2.20-2.22 of the same guidance indicate that the two components (assessment of landscape effects and assessment of visual effects) are *“...related but very different considerations...”*.

1.3.6 Further to the above, the assessment method for this landscape and visual impact assessment draws upon the established GLVIA, 3rd edition; An Approach to Landscape Character Assessment (Ref 1.33); An Approach to Seascape Character Assessment (Ref 1.34); Landscape Institute Technical Information Note 05/2017, Townscape Character Assessment (Ref 1.35); Landscape Institute Technical Guidance Note 06/19, Visual Representation of Development Proposals (Ref 1.36), and other recognised guidelines.

b) Consultation

1.3.7 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A full account of consultation undertaken is provided at **Appendix 13H** of **Volume 2** of the **ES**. A summary of the general comments raised during the most recent meeting with consultees, and SZC Co.'s responses, are detailed in **Table 1.3**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.

Table 1.3: Summary of consultation responses that have informed the scope and methodology of the landscape and visual assessment.

Consultee	Date	Summary of Discussion/Comments
Natural England (NE). Suffolk County Council (SCC). Suffolk Coastal and Waveney District Councils (SCDC/WDC) (now ESC). Suffolk Coast and Heaths AONB.	Meeting: 7 February 2019.	The purpose of the meeting was to confirm several matters regarding the scope and approach to the landscape and visual assessment, which had previously been discussed during several meetings, the first of which was in March 2014.
		The following points were agreed at the meeting:
		The Landscape and Visual Assessment Methodology to be used as the basis of the Landscape and Visual Assessment chapters.
		The Suffolk Landscape Character Assessment is to be used as the basis for the assessment of effects on landscape character, informed by other studies, including the recently published Suffolk Coastal Landscape Character Assessment. The landscape and visual assessment identifies the likely effects of the Sizewell C Project on landscape character types presented in the Suffolk Landscape Character Assessment. Where appropriate, reference is made to several other published landscape character assessments.
		The Suffolk, South Norfolk and North Essex Seascape Character Assessment is to be used as the basis for the assessment of effects on

Consultee	Date	Summary of Discussion/Comments
		<p>seascape character, informed by other studies, including the unpublished Seascape Character Assessment of the Sizewell C study area.</p> <p>The landscape and visual assessment identifies the likely effects of the proposed main development site on seascape character types presented in the Suffolk, South Norfolk and North Essex Seascape Character Assessment. Where appropriate, reference is made to the unpublished Seascape Character Assessment of the Sizewell C study area.</p>
		<p>Version 1.8 of the Suffolk Coast and Heaths AONB Natural Beauty and Special Qualities Indicators document (Ref 1.5) is to be used as the basis of the assessment of effects on the Suffolk Coast and Heaths AONB.</p> <p>The landscape and visual assessment identifies the likely effects of the Sizewell C Project on the natural beauty and special qualities indicators of the Suffolk Coast and Heaths AONB as recorded in Version 1.8 of the Suffolk Coast and Heaths AONB Natural Beauty and Special Qualities Indicators document.</p>
		<p>The Special Landscape Areas Paper (November 2016) (Ref 1.31) is to be used as the basis of the assessment of effects on the special landscape area designation.</p> <p>The landscape and visual assessment identifies the likely presents an assessment of the effects of the Sizewell C Project on the special landscape areas designation as recorded in the Special Landscape Areas Paper (November 2016) (Ref 1.31).</p>
		<p>Agreement was also reached on the location of representative viewpoints, illustrative viewpoints and the location of viewpoints to be used to generate photowire and photomontage visualisations.</p> <p>The landscape and visual assessment identifies the likely effects of the Sizewell C Project on visual receptors. Reference is made to agreed representative and illustrative viewpoint photographs. Visualisations have been prepared for agreed viewpoint locations.</p>

c) Study area

- 1.3.8 The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the landscape and visual chapters of **Volumes 2 to 9** of the **ES**. These include the site(s) and land immediately beyond it, and have been informed by the theoretical extent of visibility and likely significant effects. As identified in **Table 1.3**, study areas have been agreed with consultees. A full list of consultees is provided at **Volume 2, Appendix 13H** of the **ES**.

d) Assessment scenarios

- 1.3.9 For the proposed main development site, the landscape and visual impact assessment provides an assessment of the likely landscape and visual effects arising during the construction and operation phases. The basic assessment scenarios are as follows:

- Construction – construction is anticipated to take place over an approximately 12-year programme. The assessment has been based on a series of construction parameter drawings for phasing, zoning, heights and lighting. The construction height parameter plan indicates maximum heights for ‘normal’ activity and ‘exceptional’ activities, development and works, which comprise the use of very large cranes and similar equipment intermittently during all phases of construction. Where relevant the removal and reinstatement of infrastructure, buildings and other features at the end of the construction phase are considered.
- Operation – operation of the power station following completion of construction, dismantling of temporary features and site restoration and landscape remediation.

- 1.3.10 For the proposed associated developments, the landscape and visual assessments comprise the assessment of the entire construction and operation phases, and where relevant, removal and reinstatement phase, rather than specific assessment years.

e) Assessment criteria

- 1.3.11 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.12 A summary of the assessment criteria used in the landscape and visual assessment is presented in the following sub-sections. There are some differences between the landscape and visual methodology and the generic method reported in **Volume 1, Chapter 6** of the **ES**, to ensure that the method is appropriate for the assessment of landscape and visual effects. **Table 1.**Error! Reference source not found.**4** summarises the main deviations of the landscape and visual methodology from the generic EIA method, or additions to it, to ensure that the methodology is suitable for the assessment of landscape and visual impacts of the proposed development.

Table 1.4: Deviations between the landscape and visual assessment method and the generic EIA method.

Generic Method Presented in Volume 1, Chapter 6	Change to Method	Explanation for Change
The use of the terms 'impact' and 'effect'.	<p>The generic method uses the terminology 'magnitude of impact' or magnitude of change to define the environmental impact of the proposed development. Judgements about 'magnitude of impact' are combined with judgements about receptor sensitivity to determine the overall classification of effects.</p> <p>The landscape and visual methodology uses the terminology 'magnitude of effect' to define the environmental impact of the proposed development. Judgements about 'magnitude of effect' are combined with judgements about receptor sensitivity to determine the overall significance of effect.</p>	Guidelines for Landscape and Visual Impact Assessment (3rd edition) specifically uses the term 'magnitude of effect' which is defined as the 'nature of the effect likely to occur' and is determined by combining judgements about scale of effect; extent of effect; and duration of effect.
Duration of impact or effect.	<p>The generic method refers to short, medium or long-term effects. It adds that individual topics define terms relevant to making judgements about the duration of effects to inform judgements about magnitude of effect.</p> <p>The landscape and visual methodology defines duration as:</p> <ul style="list-style-type: none"> • Permanent – the change is expected to be permanent and there is no intention for it to be reversed. Or occurring for a period longer than 25 years. 	The method has been developed in accordance with Guidelines for Landscape and Visual Impact Assessment (3rd edition).

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Generic Method Presented in Volume 1, Chapter 6	Change to Method	Explanation for Change
	<ul style="list-style-type: none"> Long-term – the change is expected to be in place for 10-25 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe. Medium-term – the change is expected to be in place 2-10 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe. Short-term – the change is expected to be in place for 0-2 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe. 	
Sensitivity	<p>The generic method provides guidelines for the assessment of value/sensitivity (rated high, medium, low, very low).</p> <p>The landscape and visual methodology gives a single assessment of receptor sensitivity (rated high, high-medium, medium, medium-low, low, low-negligible, negligible) based on consideration of value and susceptibility.</p>	<p>The method has been developed in accordance with Guidelines for Landscape and Visual Impact Assessment (3rd edition) which recommends combining separate assessments of value and susceptibility to give an overall judgement of sensitivity.</p>
Magnitude	<p>The generic method provides guidelines for the assessment of magnitude (rated high, medium, low, very low), with a definition for each of the terms presented.</p> <p>The landscape and visual methodology presents the criteria that are used to define magnitude of effect (rated high, medium, low and negligible) drawing on judgements of scale, duration and extent of effect. Plate 1.2 below presents a tool to guide judgements of magnitude predicated on combining judgements of the scale, duration and extent of effects.</p> <p>It adds that where the scale of effect is judged to be negligible, the magnitude is also assumed to be negligible and no further judgement is required.</p>	<p>Guidelines for Landscape and Visual Impact Assessment (3rd edition) recommends considering scale, duration and extent of effect to inform the overall judgement of magnitude.</p>

NOT PROTECTIVELY MARKED

Generic Method Presented in Volume 1, Chapter 6	Change to Method	Explanation for Change
Classification of effects.	<p>The generic method classifies effects as within the range of major-moderate-minor-negligible and presents a tabulated guide to classification, predicated on combining judgements of receptor value/sensitivity and magnitude of impact. Generic definitions are presented for the terms used to describe effects.</p> <p>The landscape and visual methodology uses the terms major, major-moderate, moderate, slight and minimal for describing significance (the importance or gravity of the effect).</p> <p>The process of forming a judgement of significance is based upon the assessments of magnitude of effects and sensitivity of the receptor to come to a professional judgement of how important this effect is. This judgement is illustrated on Plate 1.2 in the Landscape and Visual Assessment Methodology.</p>	The method has been developed in accordance with Guidelines for Landscape and Visual Impact Assessment (3rd edition).
Significance	<p>The generic method considers 'major' and 'moderate' effects to be significant.</p> <p>The landscape and visual methodology describes significance ratings as indicating a 'sliding scale' of the relative importance of the effect, with major being the most important and minimal being the least.</p> <p>Effects that are major-moderate or major are considered to be significant in the landscape and visual assessment. Effects of moderate significance or less are "<i>of lesser concern</i>" (Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, 2013, paragraph 3.35).</p> <p>It is noted in the landscape and visual methodology that whilst an effect may be significant, that does not necessarily mean that such an</p>	The method has been developed in accordance with Guidelines for Landscape and Visual Impact Assessment (3rd edition).

Generic Method Presented in Volume 1, Chapter 6	Change to Method	Explanation for Change
	impact would be unacceptable or should necessarily be regarded as an ‘undue consequence’ (Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, 2013, paragraph 5.40).	

1.3.13 The assessment criteria includes consideration of value and susceptibility in determining receptor sensitivity; and consideration of the scale, extent and duration of the effect in determining magnitude. These criteria are outlined below, including how these criteria are applied and combined to form judgements of sensitivity, magnitude and significance. Further detail is provided in **Annex 6I.1** and **Annex 6I.2** of this volume.

1.3.14 The key terms used within this assessment are:

- susceptibility and value – which contribute to sensitivity of the receptor;
- scale, duration and extent - which contribute to the magnitude of effect; and
- significance.

i. Sensitivity

1.3.15 The criteria used in the landscape and visual assessments for determining the sensitivity of receptors are set out below.

1.3.16 Susceptibility, presented in **Table 1.5**, indicates the ability of a landscape or visual receptor to accommodate change “*without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*” (GLVIA, 3rd edition, para. 5.40).

Table 1.5: Susceptibility of landscape and visual receptors.

Susceptibility	Description
High	Undue consequences are likely to arise from the proposed development.
Medium	Undue consequences may arise from the proposed development.

Susceptibility	Description
Low	Undue consequences are unlikely to arise from the proposed development.

- 1.3.17 Susceptibility of landscape and seascape character areas or types is influenced by their characteristics and is frequently considered (though often recorded as ‘sensitivity’ rather than susceptibility) within documented landscape/seascape character assessments and capacity studies.
- 1.3.18 The susceptibility of designated landscapes is influenced by the nature of the special qualities and purposes of designation and/or the valued elements, qualities or characteristics, indicating the degree to which these may be unduly affected by the proposals.
- 1.3.19 Susceptibility of accessible or recreational landscapes is influenced by the nature of the landscape involved; the likely activities and expectations of people within that landscape and the degree to which those activities and expectations may be unduly affected by the development proposed.
- 1.3.20 Susceptibility of visual receptors is primarily a function of the expectations and occupation or activity of the receptors.
- 1.3.21 Landscape value, presented in **Table 1.6**, is the relative value that is attached to different landscapes by society.

Table 1.6: Landscape Value.

Landscape Value	Description
National/ International	Designated landscapes which are nationally or internationally designated for their landscape value.
Local/District	Locally or regionally designated landscapes; also areas which documentary evidence and/or site observation indicates as being more valued than the surrounding area.
Community	‘Everyday’ landscape which is appreciated by the local community but has little or no wider recognition of its value.
Limited	Despoiled or degraded landscape with little or no evidence of being valued by the community.

- 1.3.22 Areas of landscape of greater than ‘community’ value may be considered to be ‘valued landscapes’ in the context of NPPF paragraph 170 (Ref. 1.8).
- 1.3.23 For visual receptors, susceptibility and value are closely linked – the most valued views are also likely to be those where viewer’s expectations will be highest. Visual receptor value relates to the value of the view, e.g. a national

trail is nationally valued for access, not necessarily for the available views. It is therefore not possible to separate out visual receptor value from susceptibility. Typical examples of visual receptor sensitivity are plotted in a diagram in **Annex 6I.1** of this volume.

- 1.3.24 Sensitivity is assessed by combining the considerations of susceptibility and value described above. The differences in **Table 1.7** below reflects a slightly greater emphasis on value in considering landscape receptors, and a greater emphasis on susceptibility in considering visual receptors.

Table 1.7: Assessment of sensitivity of receptors for landscape and visual assessments

Landscape Sensitivity				
		Susceptibility		
		High	Medium	Low
Value	National/International	High	High-Medium	Medium
	Local/District	High-Medium	Medium	Medium-Low
	Community	Medium	Medium-Low	Low
	Limited	Low	Low-Negligible	Negligible
Visual Receptor Sensitivity				
		Susceptibility		
		High	Medium	Low
Value	National/International	High	High-Medium	Medium
	Local/District	High-Medium	High-Medium	Medium
	Community	High-Medium	Medium	Medium-Low
	Limited	Medium	Medium-Low	Low

ii. Magnitude of effect

- 1.3.25 The magnitude of effect is informed by combining the scale, duration and extent of an effect. The criteria for the assessment of magnitude are set out below.
- 1.3.26 The ‘scale of effect,’ presented in **Table 1.8**, is assessed for all landscape and visual receptors and identifies the degree of change which would arise from the development.

Table 1.8: Scale of effect

Scale	Description
Large	Total or major alteration to key elements, features, qualities or characteristics, such that post development the baseline will be fundamentally changed.
Medium	Partial alteration to key elements, features, qualities or characteristics, such that post development the baseline will be noticeably changed.
Small	Minor alteration to key elements, features, qualities or characteristics, such that post development the baseline will be largely unchanged despite discernible differences.
Negligible	Very minor alteration to key elements, features, qualities or characteristics, such that post development the baseline will be fundamentally unchanged with barely perceptible differences.

- 1.3.27 Duration of effect, presented in **Table 1.9**, is assessed for all landscape and visual receptors and identifies the time period over which the change to the receptor as a result of the development would arise.

Table 1.9: Duration of effect

Duration	Description
Permanent	The change is expected to be permanent and there is no intention for it to be reversed. Or occurring for a period longer than 25 years.
Long-term	The change is expected to be in place for 10-25 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.
Medium-term	The change is expected to be in place for 2-10 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.
Short-term	The change is expected to be in place for 0-2 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.

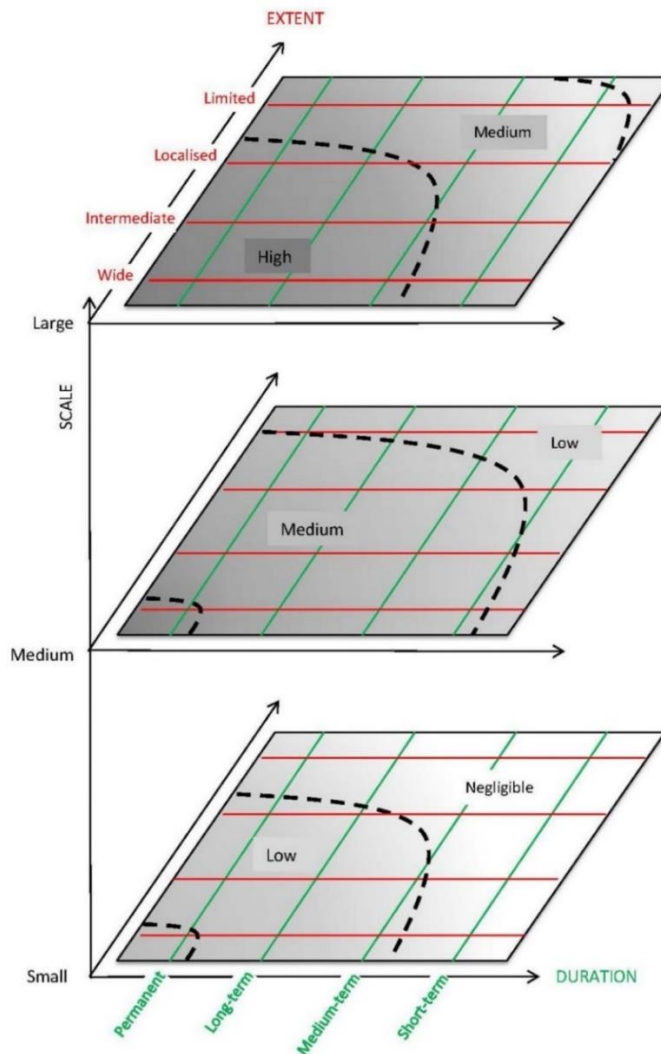
- 1.3.28 For most developments, most landscape effects will be long-term or permanent. However, medium or short-term effects may be identified where mitigation planting is proposed or local factors will result in a reduced duration of effect (for example where maturing woodland will screen views in future).
- 1.3.29 Extent of effects, presented in **Table 1.10**, is assessed for all receptors and indicates the geographic area over which the effects will be felt.

Table 1.10: Extent of effects

Extent	Description
Wide	Beyond 4 kilometres (km), or more than half of receptor area.
Intermediate	Up to approx. 2-4km, or around half of receptor area.
Localised	Site and surroundings up to 2km, or part of receptor area (up to approximately 25%).
Limited	Site, or part of site, or small part of a receptor area (< approximately 10%).

1.3.30 **Plate 1.1** below illustrates the judgement process for determining the magnitude of effects.

Plate 1.1: Magnitude of Effect



1.3.31 As can be seen from the illustration above, scale (shown as the layers of the diagram) is the primary factor in determining magnitude; most of each layer indicates that magnitude is typically be judged to be the same as scale, but may be higher if the effect is more widespread and longer term, or lower if it is constrained in geographic extent or timescale.

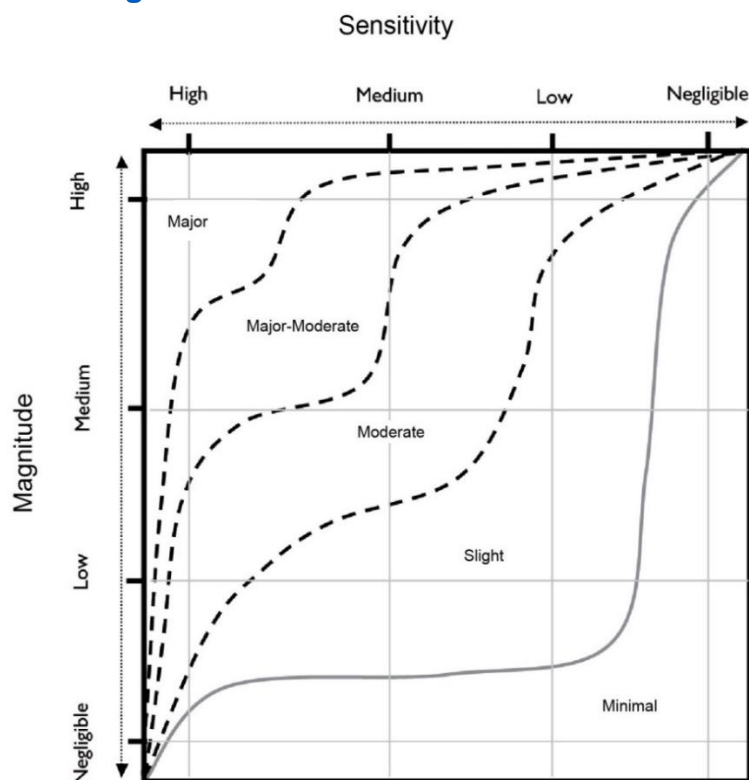
1.3.32 Where the scale of effect is judged to be negligible, the magnitude of effect is also assumed to be negligible, and no further judgement is required.

iii. Significance of effects

1.3.33 The definitions of the significance of effect for the landscape and visual assessments are shown below.

1.3.34 Significance indicates the importance or gravity of the effect. The process of forming a judgement as to the degree of significance of the effect is based upon the assessments of magnitude of effects and sensitivity of the receptor to come to a professional judgement of how important this effect is. This judgement is illustrated by **Plate 1.2** below:

Plate 1.2: Significance



1.3.35 The significance ratings indicate a 'sliding scale' of the relative importance of the effect, with major being the most important and minimal being the least.

1.3.36 Following the classification of an effect as presented above, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major-moderate or major effects are considered to be significant and effects of moderate significance or less are *"of lesser concern"* (GLVIA, 3rd edition, para 3.35) and not significant. However, professional judgement is also applied, where appropriate. It should also be noted that whilst an effect may be significant, that does not necessarily mean that such

an impact would be unacceptable, or should necessarily be regarded as an “*undue consequence*” (GLVIA, 3rd edition, para 5.40).

- 1.3.37 Where intermediate ratings are given, e.g. ‘moderate-slight,’ this indicates an effect that is both less than moderate and more than slight, rather than one which varies across the range. In such cases, the higher rating will always be given first. This does not mean that the impact is closer to that higher rating but is done to facilitate the identification of the more significant or worst-case effects within tables.

iv. Beneficial/Adverse/Neutral

- 1.3.38 Effects are defined as adverse, neutral or positive. Neutral effects are those which overall are neither adverse nor positive but may incorporate a combination of both.
- 1.3.39 The determination of the significance of effect and the decision whether an effect is beneficial, adverse or neutral are entirely separate. For example, a rating of major and beneficial would indicate an effect that was of great significance and on balance positive, but not necessarily that the proposals would be extremely beneficial.
- 1.3.40 Whether an effect is beneficial, neutral or adverse is identified based on professional judgement. GLVIA 3rd edition indicates at paragraph 2.15 that this is a “*particularly challenging*” aspect of assessment, particularly in the context of a changing landscape.

v. Residential Visual Amenity

- 1.3.41 This landscape and visual assessment does not include a separate residential amenity assessment. It is considered that the effects resulting from the proposed development would fall below the residential visual amenity threshold referred to in Landscape Institute Technical Guidance Note 02/2019 as visual effects “*of such nature and / or magnitude that it potentially affects ‘living conditions’ or Residential Amenity*”. The guidance note further indicates that “*It is not uncommon for significant adverse effects on views and visual amenity to be experienced by people at their place of residence as a result of introducing a new development into the landscape. In itself this does not necessarily cause particular planning concern. However, there are situations where the effect on the outlook / visual amenity of a residential property is so great that it is not generally considered to be in the public interest to permit such conditions to occur where they did not exist before.*”

f) Assessment methodology

i. Establishing the baseline

Existing baseline

1.3.42 For each of the landscape and visual assessments of **Volumes 2 to 9** of the **ES**, the baseline study establishes the planning policy context, the scope of the assessment and the key receptors. It includes the following key activities:

- a desk study of relevant current national and local planning policy, in respect of landscape and visual matters, for the site and surrounding areas;
- agreement of the main study area radius with relevant landscape and visual consultees;
- a desk study of nationally and locally designated landscapes for the site and surrounding areas;
- a desk study of existing landscape character assessments and capacity and sensitivity studies for the site and surrounding areas;
- a desk study of historic landscape character assessments (where available) and other information sources required to gain an understanding of the contribution of heritage assets to the present-day landscape;
- collation and evaluation of other indicators of local landscape value such as references in landscape character studies or parish plans, tourist information, local walking and cycling guides, references in art and literature;
- the identification of valued character types, landscape elements and features which may be affected by the Sizewell C Project, including rare landscape types;
- exchanging information with other consultants working on other assessment topics for the Sizewell C Project as required to inform the assessment e.g. ensuring consistency in identification of site features with terrestrial ecology chapter;

- Draft Zone of Theoretical Visibility (ZTV) studies to assist in identifying potential viewpoints and indicate the potential visibility of the proposed development, and therefore scope of receptors likely to be affected. The methodology used in the preparation of ZTV studies is described within **Annex 6I.2** of this volume;
- the identification of, and agreement upon, through consultation, the scope of assessment for cumulative effects and future baseline receptors;
- the identification of and agreement upon, through consultation, the number and location of representative and specific viewpoints within the study area;
- the identification of the range of other visual receptors (e.g. people travelling along routes, or within open access land, settlements and residential properties) within the study area;
- site visits to become familiar with the site and surrounding landscape; verify documented baseline; to identify viewpoints and receptors; and to take baseline photography. Photography has been undertaken during the winter, as agreed with key consultees, to demonstrate a worst-case scenario; and
- input to the design process. The design and assessment stages are necessarily iterative, with stages overlapping in parts. Details of any mitigation measures incorporated within the proposals to help reduce identified potential landscape and visual effects are set out within the landscape and visual assessments of **Volumes 2 to 9** of the **ES**.

1.3.43 The information gathered during the baseline assessment is drawn together and summarised in the baseline section of the relevant Landscape and Visual chapters of **Volumes 2 to 9** of the **ES** and reasoned judgements are made as to which receptors are likely to be significantly affected, based on the baseline assessment work. Only these receptors are then taken forward for the detailed assessment of effects.

Future baseline

1.3.44 The future baseline has been established with reference to the likely effects of climate change and any non-SizeWell C developments that are assumed to have been completed prior to the start of construction of the proposed development, contained in **Volume 10** of the **ES** for further details. Additional

information is also provided within relevant Landscape and Visual chapters of **Volumes 2 to 9** of the **ES**.

Assessment

1.3.45 Landscape and visual effects are assessed separately for the construction, operation and where relevant, removal and reinstatement, phases. For all phases the assessment includes further desk and site-based work, covering the following key activities:

- the preparation of a ZTV based on the finalised construction phasing or design of the main development site and proposed associated developments, where relevant;
- an assessment, of the sensitivity of receptors relating to the Sizewell C Project;
- an assessment, of the magnitude and significance of effects upon the landscape character, designated and recreational landscape and the existing visual environment arising from the Sizewell C Project;
- an informed professional judgement as to whether each identified effect is positive, neutral or adverse;
- a clear description of the effects identified, with supporting information setting out the rationale for judgements;
- identification of which effects are judged to be significant based on the significance thresholds set out within the landscape and visual assessment; and
- the production of visualisations from a selection of the agreed viewpoints showing the anticipated view of the proposed development, where relevant. In the case of the main development site, these visualisations take the form of both photowires and photomontages. For the associated development sites photowires only are produced. See **Annex 6I.2** of this volume for further details.

ii. Inter-relationships

1.3.46 Inter-relationships would arise from the Sizewell C Project on the landscape features – which also represent ecological habitats that are considered within the terrestrial ecology and ornithology assessments presented in **Volume 2, Chapter 14** and **Volumes 3 to 9, Chapter 7** of the **ES**.

1.3.47 Both the terrestrial ecology and ornithology assessments and Tree Survey and Constraints Plan presented in **Volume 2, Appendix 13I** of the **ES**, which evaluates tree/hedgerow quality and quantifies losses, have been referenced in order to inform judgements concerning the impact to landscape fabric and features.

1.3.48 Some of the visual receptors also represent cultural heritage assets. For example, the Leiston Abbey Scheduled Monument. Cultural and historic designations/attributes have been considered as one of the contributory factors towards overall landscape value and susceptibility. However, no attempt has been made to evaluate the effects of the Sizewell C Project on the value of historic and cultural receptors themselves, which is covered within the terrestrial historic environment assessments presented in **Volume 2, Chapter 16** and **Volumes 3 to 9, Chapter 9** of the **ES**.

g) **Assumptions and limitations**

1.3.49 The design and assessment stages are necessarily iterative, with stages overlapping in parts. Details of any mitigation measures incorporated within the design to help reduce identified potential landscape and visual effects are set out within the Landscape and Visual Assessment chapters as appropriate.

1.3.50 It should also be noted that areas shown as having potential visibility within a ZTV may have visibility of the proposed development obscured by local features such as trees, hedgerows, embankments or buildings.

1.3.51 Where distances are given in the assessment, these are approximate distances between the nearest part of the Sizewell C Project and the nearest part of the receptor in question, unless explicitly stated otherwise.

1.3.52 Assumptions and limitations have been identified on a site by site basis and are identified in **Volume 2, Chapter 13** and **Volumes 3 to 9, Chapter 6** of the **ES** as relevant.

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ANNEX 6I.1 LANDSCAPE AND VISUAL METHODOLOGY – FURTHER CONSIDERATIONS

6I.1. Introduction

- 6I.1.1. This annex contains additional detail regarding the assessment methodology, supplementing the information provided within **Appendix 6I** of **Volume 1** of the **Environmental Statement (ES)**. This Annex sets out a standard approach – specific matters in terms of the scope of assessment, study area and modifications to the standard approach for this assessment are set out within the landscape and visual assessments (see **Volumes 2** to **9** of the **ES**).

6I.2. Landscape Designations

- 6I.2.1. In considering the effects on designated areas, a number of factors need to be considered. The effects on the component landscape character areas/types and the effects on views from within and towards the designated area need to be understood. These effects are then considered in the light of the documented special qualities, valued elements or characteristics and the purposes of the designation in order to arrive at a judgement of the effects on the designated landscape or element.

6I.3. Site

- 6I.3.1. The effect of physical changes to the site are assessed in terms of the effects on the landscape fabric.

6I.4. Landscape, Seascape and Townscape Character Considerations

- 6I.4.1. The European Landscape Convention, 2000 (Ref. 6I.1) provides the following definition:

“Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.”

- 6I.4.2. It notes in Article 2 that landscape includes “*natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas*”.

- 6I.4.3. An Approach to Landscape Character Assessment, 2014 (Ref. 6I.2) defines landscape character as:

“a distinct and recognisable pattern of elements, or characteristics, in the landscape that make one landscape different from another, rather than better or worse.”

- 6l.4.4. The susceptibility of landscape character areas/types is judged based on both the attributes of the receiving environment and the characteristics of the proposed development as discussed under ‘susceptibility’ within the methodology section of the LVIA. Thus, the key characteristics of the landscape character areas/types are considered, along with scale, openness, topography; the absence of, or presence, nature and patterns of development, settlement, landcover, the contribution of heritage assets and historic landscape elements and patterns, and land uses in forming the character. The condition of the receiving landscape, i.e. the intactness of the existing character will also be relevant in determining susceptibility. The likelihood of material effects on the landscape character areas/types can be judged based on the scale and layout of the proposal and how this relates to the characteristics of the receiving landscape.
- 6l.4.5. The introduction of any development into a landscape adds a new feature which can affect the ‘sense of place’ in its near vicinity, but with distance, the existing characteristics reassert themselves.
- 6l.4.6. The baseline is informed by desk study of published landscape character assessments and field survey. It is specifically noted within An Approach to Landscape Character Assessment (Ref 6l.2) that:

“Our landscapes have evolved over time and they will continue to evolve – change is a constant but outcomes vary. The management of change is essential to ensure that we achieve sustainable outcomes – social, environmental and economic. Decision makers need to understand the baseline and the implications of their decisions for that baseline.”

- 6l.4.7. At page 51 it describes the function of Key Characteristics in landscape assessment, as follows:

“Key characteristics are those combinations of elements which help to give an area its distinctive sense of place. If these characteristics change, or are lost, there would be significant consequences for the current character of the landscape. Key characteristics are particularly important in the development of planning and management policies. They are important for monitoring change and can provide a useful reference point against which landscape change can be assessed. They can be used as indicators to inform thinking about whether and how the landscape is changing and whether, or not, particular policies – for example - are effective and having the desired effect on landscape character.”

- 6l.4.8. It follows from the above that in order to assess whether landscape character is significantly affected by a development, it should be determined how each of the key characteristics would be affected. The judgement of magnitude therefore reflects the degree to which the key characteristics and elements which form those characteristics will be altered by the proposed development.

6l.5. Landscape Value - Considerations

- 6l.5.1. Paragraph 5.19 of Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd edition, 2013 (Ref. 6l.3) states that *“A review of existing landscape designations is usually the starting point in understanding landscape value, but the value attached to undesignated landscapes also needs to be carefully considered and individual elements of the landscape- such as trees, buildings or hedgerows -may also have value. All need to be considered where relevant.”*
- 6l.5.2. Paragraph 5.20 of GLVIA, 3rd edition (Ref. 6l.3) indicates information which might indicate landscape value, including:
- Information about areas recognised by statute such as National Parks, Areas of Outstanding Natural Beauty.
 - Information about Heritage Coasts, where relevant.
 - Local planning documents for local landscape designations.
 - Information on features such as Conservation Areas, listed buildings, historic or cultural sites.
 - Art and literature, identifying value attached to particular areas or views.
 - Material on landscapes of local or community interest, such as local green spaces, village greens or allotments.
- 6l.5.3. An assessment of landscape value is made based on the following factors outlined in Box 5.1 of GLVIA, 3rd edition (Ref. 6l.3): landscape quality (condition); scenic quality; rarity; representativeness; conservation interest; recreational value; perceptual aspects; and associations.
- 6l.5.4. In addition to the above list, consideration is given to any evidence that indicates whether the landscape has particular value to people that would suggest that it is of greater than Community value.

6l.6. Viewpoints and Visual Receptors - Considerations

- 6l.6.1. A wide variety of visual receptors can reasonably be anticipated to be affected by the proposed development. Within the baseline assessment, the Zone of Theoretical Visibility (ZTV) study and site visits are used to

determine which visual receptors are likely to be significantly affected and therefore merit detailed assessment. In line with guidance (GLVIA, 3rd Edition, (Ref. 6l.3)); both representative and specific viewpoints may be identified to inform the assessment. In general, the majority of viewpoints will be representative – representing the visual receptors at the distance and direction in which they are located and of the type(s) that would be present at that location. The representative viewpoints are generally selected in locations where significant effects would be anticipated; though some may be selected outside of that zone – either to demonstrate the reduction of effects with distance; or to specifically ensure the representation of a particularly sensitive receptor.

6l.6.2. The types of visual receptors likely to be included with the assessment are:

- Users of walking routes or accessible landscapes including Public Rights of Way, National and Regional Trails and other long distance routes, Common Land, Open Access Land, permissive paths, land held in trust (e.g. Woodland Trust, National Trust) offering free public access, and other regularly used, permitted walking routes.
- Visitors to and residents of settlements.
- Visitors to specific valued viewpoints.
- Visitors to attractions or heritage assets for which landscape and views contribute to the experience.
- Users of roads or identified scenic routes.

6l.6.3. Visual receptors are grouped for assessment into areas which include all of the routes, public spaces and homes within that area. Groups are selected as follows:

- based around settlements in order to describe effects on that community – e.g. a settlement and routes radiating from that settlement; or
- an area of open countryside encompassing a number of routes, accessible spaces and individual dwellings; or
- an area of accessible landscape and the routes within and around it e.g. a country park; and
- such that effects within a single visual receptor group are similar enough to be readily described and assessed.

6l.6.4. With the exception of specific viewpoints, each route, settlement or location will encompass a range of possible views, which might vary from no view of the development to very clear, close views. Therefore, effects are described in such a way as to identify where views towards the development are likely

to arise and what the scale, duration and extent of those views are likely to be. In some cases this will be further informed by a nearby viewpoint and in others it will be informed with reference to the ZTV, aerial photography and site visits. Each of these individual effects are then considered together in order to reach a judgement of the effects on the visual receptors along that route, or in that place.

- 6I.6.5. The representative viewpoints are used as ‘samples’ on which to base judgements of the scale of effects on visual receptors. The viewpoints represent multiple visual receptors, and duration and extent are judged when assessing impacts on the visual receptors.
- 6I.6.6. For specific viewpoints (key and sometimes promoted viewpoints within the landscape), duration and extent are assessed, with extent reflecting the extent to which the development affects the valued qualities of the view from the specific viewpoint.

Table 1I.1: Visual Receptor Sensitivity – Typical Examples

	High	Medium	Low
National/International	1	4	8
Local/District	2	5	8
Community	3	6	9
Limited		7	10

- 1) Visitors to valued viewpoints or routes which people might visit purely to experience the view, e.g. promoted or well-known viewpoints, routes from which views that form part of the special qualities of a designated landscape can be well appreciated; key designed views; panoramic viewpoints marked on maps.
- 2) People in locations where they are likely to pause to appreciate the view, such as from local waypoints such as benches; or at key views to/from local landmarks. Visitors to local attractions, heritage assets or public parks where views are an important contributor to the experience, or key views into/out of Conservation Areas.
- 3) People in the streets around their home, or using public rights of way, navigable waterways or accessible open space (public parks, open access land).
- 4) Users of promoted scenic rail routes.
- 5) Users of promoted scenic local road routes.
- 6) Users of cycle routes, local roads and railways.
- 7) Outdoor workers.
- 8) Users of A-roads which are nationally or locally promoted scenic routes.
- 9) Users of sports facilities such as cricket grounds and golf courses.
- 10) Users of Motorways and A-roads; shoppers at retail parks, people at their (indoor) places of work.

6l.7. Preparation and use of Visuals

- 6l.7.1. The ZTVs are used to inform the field study assessment work, providing additional detail and accuracy to observations made on site. Photomontages may also be produced in order to assist readers of the assessment in visualising the proposals but are not used in reaching judgements of effect. The preparation of the ZTVs (and visualisations where applicable) is informed by the Landscape Institute's Technical Guidance Note 06/19 'Visual Representation of Development Proposals' (September 2019) (Ref. 6l.4) and Scottish Natural Heritage 'Visual Representation of Wind Farms Best Practice Guidance' (both the 2006 (Ref. 6l.5) and 2017 (Ref. 6l.6) editions).
- 6l.7.2. The following points should be borne in mind in respect of the ZTV study:
- Areas shown as having potential visibility may have visibility of the development obscured by local features such as trees, hedgerows, embankments or buildings.
- 6l.7.3. A detailed description of the methods by which ZTVs and visualisations are prepared is included in **Annex 6l.2**.
- 6l.7.4. In addition to the main visualisations, illustrative views are used as appropriate to illustrate particular points made within the assessment. These are not prepared to the same standard as they simply depict existing views, character or features rather than forming the basis for visualisations.

ANNEX 6I.2 VISUALISATIONS AND ZTV STUDIES

6I.8. ZTV Studies

- 6I.8.1. ZTV studies are prepared using the ESRI ArcGIS Viewshed routine. This creates a raster image that indicates the visibility (or not) of the points modelled. LDA Design undertake a ZTV study that is designed to include visual barriers from settlements and woodlands. If notable deviations from these assumed heights are noted during site visits, for example young or felled areas of woodland, or recent changes to built form, the features concerned will be adjusted within the model or the adoption of a digital surface model will be used to obtain actual heights for these barriers.
- 6I.8.2. Details of the data used in the ZTV are presented on the ZTV drawing.
- 6I.8.3. The model is also designed to take into account both the curvature of the earth and light refraction, informed by the Scottish Natural Heritage guidance (Ref. 6I.5 and Ref. 6I.6). LDA Design undertake all ZTV studies with observer heights of 2m.
- 6I.8.4. The ZTV analysis begins at 1m from the observation feature and will work outwards in a grid of the set resolution until it reaches the end of the terrain map for the project.
- 6I.8.5. For all plan production LDA Design produces a ZTV that has a base and overlay of the 1:50,000 Ordnance Survey Raster mapping or better. The ZTV is reproduced at a suitable scale on an A3 template to encompass the study area.

6I.9. Ground model accuracy

- 6I.9.1. Depending on the project and level of detail required, different height datasets may be used. **Table 6I.2** below lists the different data products and their specifications:

Table 1I.2: Data products and their specifications

Product	Distance Between Points	Vertical RMSE Error
LiDAR	50cm – 2m	up to +/- 5cm
Photogrammetrically Derived Heights	2m – 5m	up to +/- 1.5m
Ordnance Survey OS terrain 5	5 m	up to +/- 2.5m

Product	Distance Between Points	Vertical RMSE Error
NextMap25 DTM	25 m	+/- 2.06m
Ordnance Survey OS terrain 50	50 m	+/- 4m

6l.9.2. Site-specific topographical survey data may also be used where available.

6l.10. Photomontages and Photowires

6l.10.1. Verified / verifiable photomontages are produced in seven stages. Photowires are produced using the same overall approach, but only require some of the steps outlined below.

1. Photography is undertaken using a full frame digital SLR camera and 50mm lens. A tripod is used to take overlapping photographs which are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to enable correct sizing when reproduced in the final images. The photographer also notes the GPS location of the viewpoint and takes bearings to visible landmarks whilst at the viewpoint.
2. Creation of a ground model and 3D mesh to illustrate that model. This is created using Light Detection and Ranging (LiDAR) point data (or occasionally other terrain datasets where required, such as site-specific topographical data or Photogrammetrically Derived Heights) and ground modelling software.
3. The addition of the proposed development to the 3D model. The main components of the proposed development are accurately modelled in CAD and are then inserted into the 3D model at the proposed locations and elevations.
4. Wireline generation – The viewpoint locations are added within the 3D CAD model with each observer point being inserted at 1.5m above the modelled ground plane. The location of the landmarks identified by the photographer may also be included in the model. The view from the viewpoint is then replicated using virtual cameras to create a series of single frame images, which also include bearing markers. As with the photographs, these single frame images are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.

5. Wireline matching – The photographs are matched to the wirelines using a combination of the visible topography, bearing markers and the landmarks that have been included in the 3D model.
 6. For the photomontage, an industry standard 3D rendering application is used to produce a rendered 3D view of the proposed development from the viewpoint. The rendering uses materials to match the intended surface finishes of the development and lighting conditions according to the date and time of the viewpoint photograph.
 7. The rendered development is then added to the photograph in the position identified by the wireline (using an image processing application) to ensure accuracy. The images are then layered to ensure that the development appears in front of and behind the correct elements visible within the photograph. Where vegetation is proposed as part of the development, this is then added to the final photomontage.
- 6l.10.2. In accordance with the guidance provided in Landscape Institute Technical Guidance Note 06/19 (Ref. 6l.4), visualisations have been prepared to the technical methodology set out in **Table 6l.3**. The approach to visualisations was agreed with landscape and visual consultees in advance of Landscape Institute Technical Guidance Note 06/19 (Ref. 6l.4) being published. However, the photowires and photomontages prepared in support of the landscape and visual assessments adhere to the Type 3 visualisation specification as surveyed locational accuracy is not generally necessary but image enlargement, to illustrate perceived scale, would be appropriate.

Table 11.3: Technical Methodology

Information	Technical Response
Photography	
Method used to establish the camera location	Aerial photography in ESRI ArcGIS along with GPS reading taken on site
Likely level of accuracy of location	Better than 1m
If lenses other than 50mm have been used, explain why a different lens is appropriate	N/A
Written description of procedures for image capture and processing	See paragraph 6l.10.1 point 1 above
Make and type of Panoramic head and equipment used to level head	Manfrotto Levelling Head 338 and Manfrotto Panoramic Head MH057A5

Information	Technical Response
If working outside the UK, geographic co-ordinate system (GCS) used	N/A
3D Model/Visualisation	
Source of topographic height data and its resolution	Combination 2m LiDAR + OS Terrain 5m
How have the model and the camera locations been placed in the software?	Georeferenced model supplied by engineers/architects Camera locations taken from photography viewpoint locations
Elements in the view used as target points to check the horizontal alignment	Existing buildings, infrastructure/road alignments, telegraph poles/street lighting/signage, field boundaries, LiDAR DSM
Elements in the view used as target points to check the vertical alignment	Topography, existing buildings
3D Modelling / Rendering Software	Civil 3D / AutoCAD / 3DS Max / Rhino / V-Ray

REFERENCES

- 6l.1 Council of Europe (2000) European Landscape Convention
- 6l.2 Natural England (2014) An Approach to Landscape Character Assessment
- 6l.3 Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition
- 6l.4 Landscape Institute (2019) Technical Guidance Note 06/19 – Visual Representation of Development Proposals
- 6l.5 Scottish Natural Heritage (2006) Visual Representation of Wind Farms Guidance
- 6l.6 Scottish Natural Heritage (2017) Visual Representation of Wind Farms Guidance, Version 2.2



VOLUME 1, CHAPTER 6, APPENDIX 6J: TERRESTRIAL ECOLOGY AND ORNITHOLOGY LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1 Terrestrial Ecology and Ornithology Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects on terrestrial ecology and ornithology of the Sizewell C Project. This appendix applies to all Sizewell C Project sites relating to terrestrial ecology and ornithology, unless otherwise indicated in the topic chapters of the site assessment volumes, **Volumes 2 to 9 of the Environmental Statement (ES)**. Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in the following **ES** chapters:

- **Volume 2, Chapter 14;** and
- **Volumes 3 to 9, Chapter 7.**

1.1.3 The assessment of likely significant effects on terrestrial ecology and ornithology has also been informed by the assessments and data presented in the relevant volume chapters of noise and vibration, air quality, landscape and visual, soils and agriculture and groundwater and surface water, where relevant.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant terrestrial ecology and ornithology effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level and has influenced the identification and categorisation of sensitive resources and ecological features, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 The following Conventions and Directives have been considered as part of the ecological assessment.

i. [The Convention on Biological Diversity 1992](#)

1.2.4 The Convention on Biological Diversity 1992 (Ref. 1.1) is a multilateral treaty (signed by 150 government leaders at the 1992 Rio Earth Summit) with three main goals, of which one is the conservation of biological diversity. Article 6 of the Convention on Biological Diversity requires countries to develop national biodiversity strategies, plans or programmes in order to implement the Convention on Biological Diversity. In response, the UK developed the UK Biodiversity Action Plan (BAP) 1994 (Ref. 1.2) as well as County-specific BAPs.

1.2.5 Subsequent to this, parties of the Convention on Biological Diversity agreed the Nagoya Protocol 2010 (Ref. 1.3) as a supplementary agreement, adopting the Strategic Plan for Biodiversity 2011-2020. The purpose of this Strategic Plan is to provide a framework for establishing national and regional biodiversity targets.

ii. [The Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971](#)

1.2.6 The Convention on Wetlands 1971 (commonly known as the ‘Ramsar Convention’) (Ref. 1.4) is an intergovernmental treaty that focused on the conservation and sustainable use of wetland, primarily as habitats for water birds. Under the Ramsar Convention, each ratified country is required to identify and designate sites (known as Ramsar Sites) that meet the criteria for identifying a wetland of international importance.

iii. [Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds \(Birds Directive\) 2009](#)

1.2.7 The Birds Directive 2009 (Ref. 1.5) relates to the conservation of all species of naturally occurring birds in their wild state in the European territory of the European Union (EU) Member States to which the treaty applies. Under the Birds Directive, the most suitable areas of conservation of the Annex I species are to be designated as Special Protection Areas (SPAs).

iv. [Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora \(Habitats Directive\) 1992](#)

1.2.8 The Habitats Directive 1992 (Ref. 1.6) requires EU Member States to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest, which are listed under Annex I, II, IV and/or V. Under the Habitats Directive 1992 (Ref. 1.6), EU Member States are required to contribute to a European ecological network of protective sites through the designation of Special Areas of Conservation

(SACs) for natural habitat types listed in Annex I and habitats of species listed in Annex II.

v. [The Convention on the Conservation of European Wildlife and Natural Habitats \(Bern Convention\) 1979](#)

1.2.9 The principal aims of the Bern Convention 1979 (Ref. 1.7) are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III. To this end the Bern Convention 1979 (Ref. 1.7) imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species.

1.2.10 The UK Government ratified the Bern Convention 1979 (Ref. 1.7) in 1982.

vi. [The Convention on the Conservation of Migratory Species of Wild Animals \(Bonn Convention\) 1979](#)

1.2.11 The Bonn Convention 1979 (Ref. 1.8) was adopted in Bonn, Germany in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral Agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities.

1.2.12 The UK Government ratified the Bonn Convention 1979 (Ref. 1.8) in 1985.

b) [National](#)

i. [Legislation](#)

1.2.13 The following Acts and Regulations have been considered as part of the ecological assessment.

[The Wildlife and Countryside Act 1981](#)

1.2.14 The Wildlife and Countryside Act 1981 (Ref. 1.9) (as amended) consolidates and amends existing national legislation to implement the Bern Convention 1979 (Ref. 1.7), the Bonn Convention 1979 (Ref. 1.8) and the Birds Directive (originally adopted in 1979 and replaced in 2009) (Ref. 1.5) in England and Wales. It provides protection of wildlife (birds and some species of plants and

animals), controls the release of non-native species, and enhances the protection of Sites of Special Scientific Interest (SSSIs).

[The Conservation of Habitats and Species Regulations \(Habitat Regulations\) 2017](#)

- 1.2.15** The Conservation of Habitats and Species Regulations 2017 (Ref. 1.10) consolidated the various amendments made to the 1994 Conservation Regulations, which were developed to implement the Birds Directive (Ref. 1.5) and Habitats Directive 1992 (Ref. 1.6) at a national level. The Regulations (as amended) provide for the designation and protection of ‘European sites’, the protection of ‘European protected species’, and the adaptation of planning and other controls for the protection of European sites. The Regulations also detail the requirements for the control and protection of species and habitats.
- 1.2.16** To meet the requirements in Regulation 63(1), a Habitat Regulations Assessment (HRA) is required for any plan or project, which is not directly connected with or necessary to the management of an European site, but would be likely to have a significant effect on such a site. This is relevant, either whether considered on its own or in-combination with other plans or projects. Such projects must be subject to an ‘appropriate assessment’ of its implications for the European site in view of the site’s ‘conservation objectives’.

[Conservation of Offshore Marine Habitats and Species Regulations 2017](#)

- 1.2.17** The Conservation of Offshore Marine Habitats and Species Regulations 2017 (Ref. 1.11) transpose into national law the Habitats Directive 1992 (Ref. 1.6) and the Bird Directive 2009 (Ref. 1.5) in the UK offshore areas. These regulations apply to the UK’s offshore marine area which covers waters beyond 12 nautical miles, within British Fishery Limits and the seabed within the UK Continental Shelf Designated Area.
- 1.2.18** The Conservation of Offshore Marine Habitats and Species Regulations 2017 (Ref. 1.11) enable the designation and protection of areas that host habitats and species of European importance in the offshore marine area. In the offshore marine area, these sites are defined collectively as ‘European offshore marine sites’ and, together with all other terrestrial and marine SACs and SPAs across the EU, form a network of sites known as Natura 2000.

[Countryside and Rights of Way Act 2000](#)

- 1.2.19** The Countryside and Rights of Way (CRoW) Act 2000 (Ref. 1.12) provides for public access on foot to certain land types, amends the law for public

rights of way, increases protection for SSSIs, and strengthens wildlife enforcement legislation.

[The Natural Environment and Rural Communities Act 2006](#)

- 1.2.20 The Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 1.13) requires that any public body or statutory undertaker in England and Wales must have regard to the purpose of conservation of biological diversity in the exercise of their functions. The intention is to help ensure that biodiversity becomes an integral consideration in the development of policies, and that decisions of public bodies work with the grain of nature and not against it.

- 1.2.21 Section 40 of the NERC Act 2006 (Ref. 1.13) specifies the requirements for conserving biodiversity and Section 41 requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. This list was developed in consultation with Natural England and consists of 56 habitats and 943 species.

[The Hedgerows Regulation 1997](#)

- 1.2.22 The Hedgerows Regulations 1997 (Ref. 1.14) provide protection for ‘important’ hedgerows for which replanting is not a substitute. The ‘importance’ of a hedgerow depends upon several archaeological, wildlife and landscape criteria (which are outlined in the Regulations).

[Protection of Badgers Act 1992](#)

- 1.2.23 Badgers receive legal protection under the Protection of Badgers Act 1992 (Ref. 1.15). Under this legislation, it is an offence (subject to specified exceptions) to:

- wilfully kill, injure or take, or attempt to kill, injure or take, a badger;
- cruelly ill-treats a badger; and
- interferes with a badger sett by doing any of the following:
 - damaged a badger sett or any part of it;
 - destroys a badger sett;
 - obstruct access to, or any entrance of, a badger sett;
 - caused a dog to enter a badger sett; and
 - disturbs a badger when it is occupying a badger sett.

ii. National Policy Statements 2011

- 1.2.24 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.16) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.16). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.25 The NPSs set out the Government’s energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants’ assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.26 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1** and **Table 1.2**.

Table 1.1: Requirements of the National Policy Statement for Energy (EN-1)

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1 4.2.1	<i>“All proposals for projects that are subject to the European Environmental Impact Assessment Directive must be accompanied by an Environmental Statement (ES) describing the aspects of the environment likely to be significantly affected by the project. The Directive specifically refers to effects on human beings, fauna and flora, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them. The Directive requires an assessment of the likely significant effects of the proposed project on the environment, covering the direct effects and any indirect, secondary,</i>	For Volume 2, Chapter 14 of the ES (the main development site) the baseline for flora and fauna has been detailed within sections 14.6 to 14.14 and the the supporting ecological baseline appendices. Sections 14.6 to 14.14 also identifies and assesses the Important Ecological Features (IEFs), in line with the methodology defined within this document. For Volumes 3 – 9, Chapter 7 of the ES (the assisted development sites) the baseline for flora and fauna has been detailed within section 7.4 and the the supporting ecological baseline appendices. Section 7.4 also identifies the Important Ecological Features (IEFs), for which the impacts have been assessed within section 7.6 , in line with the methodology defined within this document

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>cumulative, short, medium and long-term, permanent and temporary, positive and negative effects at all stages of the project, and also of the measures envisaged for avoiding or mitigating significant adverse effects.”</i>	
EN-1 4.3	<i>“Under the Habitats and Species Regulations consideration must be given to whether the project may have a significant effect on a European site, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects. In the event that an Appropriate Assessment is required, the applicant must provide information as may reasonably be required to enable the Appropriate Assessment to be conducted. This should include information on any mitigation measures that are proposed to minimise or avoid likely effects”</i>	A Shadow HRA Report (Doc Ref. 5.10) has been completed for the Sizewell C Project.
EN-1 4.10.2	<i>“It [planning and pollution control systems] plays a key role in protecting and improving the natural environment, public health and safety, and amenity, for example by attaching conditions to allow developments which would otherwise not be environmentally acceptable to proceed, and preventing harmful development which cannot be made acceptable even through conditions. Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances</i>	<p>Details of the primary and tertiary mitigation which would result in the implementation of pollution control systems, both during construction, operation and removal and reinstatement, are detailed within:</p> <ul style="list-style-type: none"> • Volume 2, Chapter 14 of the ES (the main development site) section 14.4; and • Volumes 3 to 9, Chapter 7 of the ES (the assisted development sites) section 7.5. <p>The inclusion of this mitigation within the Sizewell C Project construction and operational design have been considered when considering impacts on IEFs within:</p>

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>to the environment from different sources to the lowest practicable level. It also ensures that ambient air and water quality meet standards that guard against impacts to the environment or human health.</i>	<ul style="list-style-type: none"> Volume 2, Chapter 14 of the ES (the main development site) sections 14.6 to 14.14; and Volumes 3 to 9, Chapter 7 of the ES (the assisted development sites) section 7.6.
EN-1 5.2.3	<i>“A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NOx and ammonia. The main emissions from energy infrastructure are from generating stations. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. In aquatic ecosystems it can cause changes to algal composition and lead to algal blooms, which remove oxygen from the water, adversely affecting plants and fish. The effects on ecosystems can be short term or irreversible, and can have a large impact on ecosystem services such as pollination, aesthetic services and water supply.”</i>	Air quality modelling has been undertaken, the effects of which have been considered within the terrestrial ecology and ornithology assessment, where relevant.
EN-1 5.2.7	<i>“The ES should describe... any potential eutrophication impacts.”</i>	Please see response to EN-1 5.2.3 above.
EN-1 5.3.3	<i>“Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological</i>	Designated sites have been detailed within: <ul style="list-style-type: none"> Volume 2, Chapter 14: section 14.6 of the ES and supporting technical appendices.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.”</i>	<ul style="list-style-type: none"> Volumes 3 to 9, Chapter 7: section 7.4 of the ES and supporting technical appendices. <p>Where relevant, these have been either scoped in or out of the detailed assessment, with full justification provided. If taken forward for assessment, the effects have been described:</p> <ul style="list-style-type: none"> Volume 2, Chapter 14 of the ES: sections 14.6 to 14.14. Volumes 3 to 9, Chapter 7 of the ES: section 7.6.
EN-1 5.3.4	<i>“The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.”</i>	<p>The primary and tertiary mitigation details the mitigation measures embedded into the design of the Sizewell C Project, and highlights how these measures protect the habitat and species onsite. These are detailed in:</p> <ul style="list-style-type: none"> Volume 2, Chapter 14 of the ES: section 14.4. Volumes 3 to 9, Chapter 7 of the ES: section 7.5. <p>These design measures have been taken into consideration when conducting the impact assessment within:</p> <ul style="list-style-type: none"> Volume 2, Chapter 14 of the ES: sections 14.6 to 14.14. Volumes 3 to 9, Chapter 7 of the ES: section 7.6.
EN-1 5.3.18	<i>“The applicant should include appropriate mitigation measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; during construction and operation best practice will be followed to ensure that risk of disturbance or</i>	See response to EN-1 5.3.4 above

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<p>damage to species or habitats is minimised, including as a consequence of transport access arrangements;</p> <p>habitats will, where practicable, be restored after construction works have finished; and</p> <p>opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.”</p>	

Table 1.2: Requirements of the National Policy Statement for Nuclear Power Generation (EN-6)

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-6 1.7.4	<p>“Possible adverse effects on nature conservation sites of European importance were identified by the Nuclear Habitats Regulations Assessment (HRA). Further studies will need to be carried out, as part of the project HRA and environmental impact assessment (EIA) processes for individual development consent applications, to determine the significance of the effects and the effectiveness of any mitigation measures.”</p> <p>“Possible significant adverse effects on nationally important nature conservation sites and designated landscapes were identified by the Nuclear AoS. Further studies will need to be carried out, as part of the project EIA process for</p>	<p>A Shadow HRA Report (Doc Ref. 5.10) has been completed for the Sizewell C Project.</p> <p>Within this ES, the methodology to determine the ecological baseline and baseline for terrestrial ecology and ornithology has been detailed within this document.</p> <p>See response to EN-1 4.2.1 in Table 1.1.</p>

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>individual development consent applications, to determine the significance of the effects and the effectiveness of any mitigation measures.”</i>	
EN-6 3.9.4	<i>“At the project level, baseline studies on nationally and internationally important habitats and species that may be affected as a result of the development should be undertaken by the applicant to inform the assessment of the cumulative ecological effects”</i>	Extensive baseline studies of nationally and internationally important habitats and species have been undertaken for the Sizewell C Project. These are presented within: <ul style="list-style-type: none"> • Volume 2, Chapter 14 of the ES: sections 14.6 to 14.14 and supporting technical appendices. • Volumes 3 to 9, Chapter 7 of the ES: section 7.4 and supporting technical appendices.
EN-6 3.9.6	<i>“As well as the options for mitigation set out in EN-1, the Nuclear AoS and HRA have identified possible mitigation options. These include variations to building layout to avoid ecologically sensitive areas and on-site measures to protect habitats and species and to avoid or minimise pollution and the disturbance of wildlife.”</i>	The site boundaries have been restricted to avoid the most sensitive habitats. Primary and tertiary mitigation measures which detail measure to avoid or minimise impacts to ecology have been described in: <ul style="list-style-type: none"> • Volume 2, Chapter 14 of the ES: section 14.4. • Volumes 3 to 9, Chapter 7 of the ES: section 7.5.
EN-6 Annex A A.7.4	<i>“All project level Habitats Regulations Assessments must take account of the potential adverse effects and the proposed avoidance and mitigation measures identified through the strategic level assessment(s).“</i>	A Shadow HRA Report (Doc Ref. 5.10) has been completed for the Sizewell C Project.
EN-6 Annex C C.8.53	<i>“A precautionary approach suggests that the assessment at this strategic level cannot rule out the potential for adverse effects on the integrity of nine European Sites (Alde-Ore and Butley Estuaries Special Area of</i>	Designated sites have been detailed within the below sections, which also detail the specific Zones of Influence (Zols) used to determine which sites have been considered within the ES : <ul style="list-style-type: none"> • Volume 2, Chapter 14 of the ES: section 14.6 and supporting technical appendices.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>Conservation (SAC), Alde-Ore Estuary SPA / Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA/ Ramsar, Orfordness-Shingle Street SAC, Sandlings SPA, Outer Thames Estuary SPA) through potential impacts on water resources and quality, habitat and species loss and fragmentation, and disturbance (noise, light and visual)."</i>	<ul style="list-style-type: none"> • Volumes 3 to 9, Chapter 7 of the ES: section 7.4 and supporting technical appendices. <p>Where relevant, these have been either scoped in or out of the detailed assessment, with full justification. If taken forward for assessment, the effects have been described:</p> <ul style="list-style-type: none"> • Volume 2, Chapter 14 of the ES: sections 14.6 to 14.14. • Volumes 3 to 9, Chapter 7 of the ES: section 7.6.
EN-6 Annex C C.8.54	<i>"The Habitats Regulations Assessment on sites of international importance has proposed a suite of avoidance and mitigation measures to be considered as part of the project level Habitats Regulations Assessment. At this stage, it is assessed that the effective implementation of the proposed suite of avoidance and mitigation measures may help to address adverse effects on European Site integrity, but that more detailed project level Habitats Regulations Assessment is required to reach conclusions that are in accordance with the requirements of the Habitats Directive."</i>	A Shadow HRA Report (Doc Ref. 5.10) has been completed for the Sizewell C Project.
EN-6 Annex C C.8.60	<i>"Some responses focused on designated sites including Sizewell Marshes Site of Special Scientific Interest (SSSI) and Leiston-Aldeburgh SSSI, and potential effects on Minsmere-Walberswick Heaths and Marshes SSSI, from which the site boundary includes some land-take. Some responses</i>	See response to EN-6 Annex C C.8.53 above.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>questioned how direct land take could be mitigated”</i>	
EN-6 Annex C C.8.61	<i>“The Appraisal of Sustainability identified the potential for adverse effects on sites and species considered to be of national nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Appraisal of Sustainability identifies that there could be potential significant effects at the following SSSIs which are within 5km of the site: Sizewell Marshes SSSI; Minsmere-Walberswick Heaths and Marshes SSSI; Leiston-Aldeburgh SSSI; Alde-Ore Estuary SSSI.”</i>	See response to EN-6 Annex C C.8.53 above.
EN-6 Annex C C.8.65	<i>“The Government has noted that there will be further assessment of any proposal for [Sizewell C] at the project level and that EN-1 sets out detailed consideration that must be given to issues related to nationally designated sites, should an application for development consent come forward”</i>	See response to EN-6 Annex C C.8.53 above.

iii. National Planning Policy Framework 2019

- 1.2.27 The National Planning Policy Framework (NPPF) (Ref. 1.17) sets out the Government’s planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF). Section 15 (paragraphs 170-183) of the NPPF specifies the requirements for conserving and enhancing the natural environment through the planning and development process to minimise impacts on habitats and biodiversity.

iv. Planning Practice Guidance 2019

- 1.2.28 The Planning Practice Guidance 2019 (Ref. 1.18) is a web-resource to support the NPPF (Ref. 1.17), including guidance for Environmental Impact Assessments (Ref. 1.19) and the Natural Environment (Ref. 1.20). The guidance for the Natural Environment (Ref. 1.20) explains key issues in implementing the NPPF to protect and enhance the natural environment, including local requirements.

v. Government's 25 Year Environment Plan 2018

- 1.2.29 The Government's 25 Year Environment Plan 2018 (Ref. 1.21) sets out how the UK Government intends to improve the natural health of the UK through improving air and water quality, protection of threatened species, and improving the biodiversity of habitats, as well as setting out how the effects of climate change will be tackled. The plan sets out a number of goals and corresponding policies that look at managing land sustainably, improving and enhancing landscapes and biodiversity for both marine and terrestrial environments, improving resource efficiency and reducing waste and pollution, whilst also examining the UK's contribution to improving the global environment.

c) Regional

i. Suffolk Nature Strategy 2015

- 1.2.30 Developed by Suffolk County Council, Suffolk Wildlife Trust (SWT), Royal Society for the Protection of Birds (RSPB) and the National Trust; the Suffolk Nature Strategy 2015 (Ref. 1.22) outlines the county's priorities and how the landscape and wildlife in Suffolk contribute to economic growth, health and wellbeing. Section 1 of this Strategy is related to the natural environmental priorities and sets out recommendations for the protection of wildlife sites, landscapes, priority species and habitats, urban green space, agri-environment, and woodland and forestry. Under Section 2, which is in relation to economic growth, it details recommendations for natural capital and biodiversity offsetting.

ii. Suffolk Local Biodiversity Action Plan (BAP) 2012 and Suffolk's Priority Species and Habitats list 2015

- 1.2.31 When the UK BAP 1994 (Ref. 1.2) was replaced with the 'UK Post-2010 Biodiversity Framework' 2012 (Ref. 1.23) this resulted in the BAP process being developed at a local level with each county deciding its own way forward. In June 2013 the decision was made to continue to support the Suffolk BAP 2012 (Ref. 1.24), due to its strong association with the NERC Act 2006 (Ref. 1.13) and planning policy. The Suffolk Biodiversity

Partnership has developed the Suffolk BAP 2012 (Ref. 1.24), which includes the Suffolk's Priority Species and Habitats list 2015 (Ref. 1.25). This list is continually evolving (last updated August 2015), and is published on-line.

d) **Local**

- 1.2.32** The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.
- 1.2.33** Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.
- 1.2.34** The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013) (Ref. 1.26); and the Site Allocations and Area Specific Policies Development Plan Document (2017).
- 1.2.35** In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref. 1.27) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.
- 1.2.36** The terrestrial ecology and ornithology assessment has considered the following local planning policies:
- iii. Suffolk Coastal District Council Local Plan Core Strategy 2013 and Development Management Policies**
- 1.2.37** The SCDC Local Plan 2013 (Ref. 1.26) sets out Development Management Policy DM27 aimed at protecting and maximising biodiversity and geodiversity value. Development Management Policy DM26 also details minimising of light pollution, aimed at minimising pollution from glare and light spillage in to areas of nature conservation importance, amongst others.
- 1.2.38** Policy AP15 is aimed at protecting European, national and locally designated sites.
- 1.2.39** Strategic Policy SP13 considers nuclear energy in relation to the potential for additional nuclear power station(s) at Sizewell. This includes the need for suitable consideration of off-site land requirements, notably during construction.

iv. **Suffolk Coastal District Council Final Draft Local Plan 2019**

1.2.40 The Suffolk Final Draft Local Plan 2019 (Ref. 1.27) sets out the strategic planning policies within East Suffolk and implements the requirements of the NPPF on a local basis. The policies relevant to terrestrial ecology and ornithology within the Final Draft Local Plan are detailed in Section 10, and are specifically:

- Policy Suffolk Coastal Local Plan 10.1: Biodiversity and Geodiversity: Development will be supported where it can demonstrate that it maintains, restores or enhances existing green infrastructure. Proposals are to demonstrate no direct or indirect adverse impacts to locally designated sites, and where they do, demonstrate that the proposal outweighs the biodiversity loss. New developments should provide environmental net gains in terms of both green infrastructure and biodiversity, and secure ecological enhancement as part of design and implementation. Where a UK protected or Suffolk priority habitat and species is to be affected, an appropriate survey and assessment is to be conducted, followed by appropriate mitigation proposals.
- Policy Suffolk Coastal Local Plan 10.2: Visitor Management of European Sites: The Council has a duty to ensure that any proposal will not result in an increase in activity likely to have a significant effect upon internationally designated sites.
- Policy Suffolk Coastal Local Plan 10.3: Environmental Quality: Development proposals are required to protect the quality of the environment and to minimise and, where possible, reduce all forms of pollution. This includes air quality, soils, loss of agricultural land, land contamination, water quality, light pollution and noise pollution.
- Policy Suffolk Coastal Local Plan 10.4: Landscape Character: Development proposals are expected to demonstrate their location scale, form, design and materials will protect and enhance: the special qualities and features of an area; the visual relationship and environment around settlements and their landscape settings; distinctive landscape elements including but not limited to watercourses, commons, woodland trees, hedgerows and field boundaries, and their function as ecological corridors; visually sensitive skylines, seascapes, river valleys and significant views towards key landscapes and cultural features; and growing a network of green infrastructure.

v. Government Circular 06/2005 on Biodiversity and Geological Conservation

1.2.41 County Wildlife Sites (CWS) are recognised by the NPPF 2019 (Ref. 1.17) and the Government Circular 06/2005 on Biodiversity and Geological Conservation (Ref. 1.28) as having a fundamental role to play in meeting national biodiversity targets. CWS are not protected by legislation, but their importance is recognised by local authorities when considering any relevant planning applications and there is a presumption against granting permission for development that would have an adverse impact on a site. Such measures have been strengthened by the provisions of the NERC Act 2006 (Ref. 1.13) which requires all public bodies to 'have regard for' the conservation of biodiversity. SWT monitors planning applications for any potential impact on CWSs.

e) Guidance

1.2.42 The assessment of likely significant effects on terrestrial ecology and ornithology has been undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EclA) (Ref. 1.29), to provide the determining body with clear and concise information about the likely significant ecological effects associated with the Sizewell C Project. In addition, the following guidance documents were considered, where relevant, during the survey and assessment process.

- Handbook for Phase 1 Habitat survey – a technique for environmental audit (2010) (Ref. 1.30);
- The National Vegetation Classification (NVC) user's handbook (2006) (Ref. 1.31);
- Hedgerows Regulations Guidelines (1997) (Ref. 1.14);
- Bird Monitoring Methods: A Manual of Techniques for Key UK Species (1998) (Ref. 1.32);
- UK Birds of Conservation Concern (BoCC) (2015) (Ref. 1.33);
- Red Data Book (RDB) of British Invertebrates (1991) (Ref. 1.34);
- Procedures for collecting and analysing macro-invertebrate samples (1999) (Ref. 1.35);
- Joint Nature Conservation Committee guidance on monitoring invertebrates within protected sites (2011) (Ref. 1.36);

- Natural England's Surveying terrestrial and freshwater invertebrates for conservation evaluation (2007) (Ref. 1.37);
- Technical Information Note 102 – Reptile Mitigation Guidelines (2011) (Ref. 1.38);
- Froglife Advice Sheet 10 on reptile surveys (1999) (Ref. 1.39);
- Great crested newt mitigation guidelines (2001) (Ref. 1.40);
- Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*) (2000) (Ref. 1.41);
- Natural England. Standing advice for local planning authorities who need to assess the impacts of development on badgers (2015) (Ref. 1.42); and
- Bat surveys pre-2016: Bat Surveys: Good Practice Guidelines, 2nd edition (2012) (Ref. 1.43). Please note all bat surveys were conducted in accordance with or above the requirements within the guidance in place at the time of survey. Although this guidance was updated in 2016, the surveys undertaken are suitable for assessment as agreed via numerous consultees.
- Bat surveys post-2016: Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition (2016) (Ref. 1.44).

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.

1.3.2 This section provides specific details of the terrestrial ecology and ornithology methodology as applied to the assessment of the Sizewell C Project and a summary of the general approach to provide appropriate context for the assessment that follows. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable).

- 1.3.3 To comply with the CIEEM Guidelines for EclA (Ref. 1.29), this EclA has identified the IEFs¹ that are of sufficient importance and likely to be sufficiently affected by the Sizewell C Project so as to be a material consideration in the planning decision and require a more detailed assessment. The same process also allowed for the identification of those IEFs that are not likely to be significantly affected and so do not require further assessment and can reasonably be scoped out of the EclA.
- 1.3.4 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.5 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- f) Consultation
- 1.3.6 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory and non-statutory consultees throughout the design and assessment process. A large number of workshops and other meetings have been held since 2013 with ecological consultees, including Natural England, the Environment Agency, Suffolk County Council, ESC (formerly SCDC), the RSPB and the SWT.
- 1.3.7 A summary of the general comments raised and EDF Energy's and SZC Co.'s responses are detailed in **Table 1.3**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant. **Table 1.3** below only summarises a selection of early responses which relate directly to the assessment methodologies. A more wide-ranging consultation table covering the period 2018-2019 in respect of the main development site is provided in **Appendix 14C8, Volume 2, Chapter 14** of the **ES**.

¹ An Important Ecological Feature is defined as "Ecological features requiring specific assessment within EclA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity)." (1.2929).

Table 1.3: Summary of consultation responses that have informed the scope and methodology of the terrestrial ecology and ornithology assessment

Consultee	Date	Summary Of Discussion/Comments
Natural England	29 January 2013	Survey approach and methods for bats (especially barbastelles (<i>Barbastella barbastellus</i>)) as required to inform the EIA and European protected species licence(s)
Natural England, RSPB & SWT	26 September 2014, 3 December 2014 & 9 January 2015	Discussion and site visit (9 January 2015) on the marsh harrier survey methodology and baseline evaluation.
Natural England & RSPB	24 April 2015	NVC mapping was agreed for the main development site. It was agreed that the vegetation and invertebrate communities on the coastal dune are of national value (although this is not reflected in the designation which is a CWS). It was agreed that extensive invertebrate sampling had been carried out although stakeholders thought that all habitats to be potentially affected by the Sizewell C Project directly or indirectly should be surveyed. EDF Energy argued that representative habitats had been surveyed, focussing on those habitats within the Sizewell Marshes SSSI triangle that would be lost.
Natural England, RSPB & SWT	24 November 2015	With regards to disturbance effects on birds, the draft assessment and mitigation approach were broadly agreed. There was some uncertainty over appropriateness of the assumed 150m visual buffer especially in the vicinity of the borrow pits and main stockpile. Concerns were expressed over the potential mitigation land to be compromised by noise from the borrow pits. There were concerns about why some historic harrier survey data which appeared to show greater use of by harriers of the Sizewell belts hadn't been used in the assessment. One of the key recommendations (from SWT) was to investigate whether their wetland reserve at Trimley Marshes next to Felixstowe docks, where a pair of marsh harriers forage and could potentially breed, could be used to investigate the relationship between noise and harrier foraging (and breeding) activity, to strengthen the evidence base in the HRA.

Consultee	Date	Summary Of Discussion/Comments
		Concerns were raised with regards to potential impacts on the marsh harrier mitigation area due to use of the field north of Ash Wood. SZC Co. stated that in developing proposals for a borrow pit on this land, SZC Co. would take account of the need to protect the mitigation land from unacceptable levels of noise/disturbance.
Natural England, RSPB & SWT	25 February 2016	SZC Co.'s mock assessment for recreational disturbance effects was largely agreed. It was agreed that sufficient user surveys had been carried out and that upper range (precautionary) baseline estimates should be used in the assessment. There was broad agreement with the baseline evaluation of designated sites. SZC Co.'s view that potential impacts on designated sites can't be discounted at a handful of sites including Westleton heath were broadly accepted. There was consensus that the proposed mitigation approach was sensible.
Natural England, RSPB & SWT	26 June 2016	There was general consensus that a lot of ecological survey work has been carried out using a number of different techniques over many years and that it was therefore likely to be relatively robust. The key area of outstanding work that was acknowledged was on completing the tree roost survey strategy. SZC Co.'s emerging strategy to avoid creating bat corridors through the main development site other than at the SSSI crossing was discussed. It was flagged that connectivity to/from roosts at Upper Abbey Farm need to be considered. It was noted that whilst the focus on barbastelle was appropriate the mitigation strategy needs to accommodate as much of the bat assemblage as possible. The sizing of any culvert would be key. It was also noted that noise/light disturbance at either end of the culvert and within the Sizewell Belts would need to be mitigated.
Natural England	7 July 2016	SZC Co. agreed to develop proposals for the recreation strategy.
Natural England	27 July 2016	There was agreement on the baseline evaluation of the floristics of the M22 fen meadow communities within the Sizewell Belts and the extent of potential inadequacies in

Consultee	Date	Summary Of Discussion/Comments
		published evidence on tolerances and sensitivities to hydrological change.
SCDC	20 October 2016	With regards to operational emissions assessment for the diesel generators: further work is required to consider the sensitivity of ecological receptors in the vicinity of the site. At this stage it is considered unlikely that there will be any significant effects on ecological receptors.

g) Study area

- 1.3.8** The study area includes the land within the site boundary and the Zol (defined below) of the Sizewell C Project. The survey area for which baseline data was collected is defined as *“the geographical extent over which a particular field survey activity took place”*. The survey area differed depending on the ecological feature being surveyed. Both the study area and survey area differs depending on the ecological feature being considered/surveyed, due to the variable sensitivity of terrestrial ecological and ornithological features.
- 1.3.9** Ecological features have been considered within areas of the relevant site boundaries and their immediate environs, taking into account their legislative protection, conservation status and their status/distribution in the vicinity of the site being considered, as well as desk-study information and previous survey work.
- 1.3.10** Areas and resources that may be affected by the identified activities arising from the whole lifespan of the Sizewell C Project at the main development site and associated development sites have been considered. These define the Zol, which is defined as *“the area over which ecological features may be affected by potential biophysical changes caused by a proposed project and associated activities”* (Ref. 1.29).
- 1.3.11** The specific study areas, survey areas and Zol for the main development site and the associated development sites are described within the methodology sub-sections of the terrestrial ecology and ornithology chapters of **Volumes 2 to 9** of the **ES**.

h) Assessment scenarios

- 1.3.12** The assessment of effects on terrestrial ecology and ornithology is based on each of the construction, operation and removal and reinstatement (if applicable) phases of the Sizewell C Project, rather than specific assessment

years. Further detail on the different considerations of these phases is detailed below.

i) **Assessment criteria**

1.3.13 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or ecological features. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/ecological features that could be affected in order to classify effects.

1.3.14 A detailed description of the assessment methodology used to assess the potential effects on terrestrial ecology and ornithology is presented in the following sub-sections.

i. **Sensitivity**

1.3.15 The definitions of value and sensitivity criteria used in the terrestrial ecology and ornithology assessment are set out in **Table 1.4**. Value and sensitivity are assessed separately, as they are to an extent independent of each other.

Table 1.4: EIA criteria for the assessment of terrestrial ecological and ornithology value/sensitivity

Importance/Sensitivity	Guidelines
High	<p>Value: Ecological feature possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/ecological feature (e.g. designated features of international/national importance, such as SACs, SPAs, Ramsar sites and SSSIs).</p> <p>Sensitivity: Ecological feature has a very low capacity to accommodate the proposed form of change.</p>
Medium	<p>Value: Ecological feature possesses key characteristics which contribute significantly to the distinctiveness and character of the site/ecological feature (e.g. designated features of regional or county importance such as CWSs and local BAP species).</p> <p>Sensitivity: Ecological feature has a low capacity to accommodate the proposed form of change.</p>
Low	<p>Value: Ecological feature only possesses characteristics which are locally significant. Ecological feature is not designated or only designated at a district or local level.</p> <p>Sensitivity: Ecological feature has some tolerance to accommodate the proposed change.</p>
Very Low	<p>Value: Ecological feature characteristics do not make a significant contribution to local character or distinctiveness. Ecological feature not designated.</p>

Importance/Sensitivity	Guidelines
	Sensitivity: Ecological feature is generally tolerant and can accommodate the proposed change.

1.3.16 The sensitivity of individual IEFs within the Zol of the Sizewell C Project is determined where the potential impacts on IEFs are described. Different IEFs may have different levels of sensitivity, depending upon the type of impact being described as well as the predicted duration, extent and magnitude of the impact. The sensitivity of individual IEFs has been qualified, where sufficient information exists. In the absence of detailed information, professional judgement has been used to determine the sensitivity of individual IEFs.

1.3.17 In addition, in line with the CIEEM guidelines (Ref. 1.29), the importance of an ecological feature, as determined with reference to legal, policy and/or nature conservation considerations, has been assessed within the following geographical context:

- international and European importance;
- national importance (i.e. England);
- regional importance (i.e. the East of England);
- county importance (i.e. Suffolk); and
- local importance, including assessment within an ESC context, or within the Zol of the Sizewell C Project.

ii. Magnitude

1.3.18 The criteria for the assessment of magnitude of impact are shown in **Table 1.5**.

Table 1.5: Assessment of magnitude of impact for terrestrial ecology and ornithology

Magnitude	Criteria
High	Large-scale, permanent/irreversible changes over a large area; for example, loss of greater than 30% of designated site/habitat used by an ecological receptor or greater than 30% loss of a species population within the development area (where this can be determined).
Medium	Medium-scale, permanent/irreversible changes; for example, loss of between 5 and 30% of designated site/habitat used by an ecological

Magnitude	Criteria
	receptor or loss of between 5 and 30% of a species population within the development area (where this can be determined).
Low	Noticeable but small-scale change over a partial area; for example, loss of between 1 and 5% of designated site/habitat used by a receptor or loss of a few individuals of a species population.
Very Low	Noticeable, but very small-scale change; for example, less than 1% of designated site/habitat used by an ecological receptor.

1.3.19 Where possible, magnitude of impact has been quantified taking account of not only the habitat or species resource within the site but also within the wider area, as appropriate. For example, for bats, consideration has been given to the Core Sustainance Zone (CSZ) for each species, but also habitat quality within the CSZ.

1.3.20 In compliance with the CIEEM guidelines (Ref. 1.29) impacts on biodiversity are assessed not only by magnitude, but are also characterised and described as positive/negative together with their extent, duration, reversibility, timing and frequency (figures for percentage loss in **Table 1.5** above are therefore indicative and not absolute). **Table 1.6** provides impact criteria used in line with the CIEEM guidelines.

Table 1.6: Criteria for determining the impact on ecological features under CIEEM guidelines (Ref. 1.29)

Characteristic	Criteria
Positive or Negative	Positive impact: a change that improves the quality of the environment. Positive impacts may also include halting or slowing an existing decline in the quality of the environment. Negative impact: a change that reduces the quality of the environment.
Extent	The spatial or geographic area over which the impact/effect may occur.
Magnitude	Refers to the size, amount, intensity and volume. It will be quantified if possible and expressed in absolute or relative terms.
Duration	Duration will be defined in relation to ecological characteristics (such as a species' lifecycle), as well as human timeframes. The duration of an activity may differ from the duration of the resulting effect caused by the activity. Effects may be described as short, medium or long-term and permanent or temporary. Where durations of short, medium, long-term and temporary are given in this assessment, they are defined in months/years, where possible, and often depends on the IEF being assessed.
Frequency	The number of times an activity that will impact biodiversity will occur.

Characteristic	Criteria
Timing	The timing of an activity or change caused by the project may result in an impact if this coincides with critical life-stages or seasons.
Reversibility	Irreversible: an effect from which recovery is not possible within a reasonable timescale or there is no reasonable change of action being taken to reverse it. Reversible: an effect from which spontaneous recovery is possible or which may be counteracted by mitigation.

1.3.21 Impacts can also be defined as being direct or indirect. A direct impact is defined as an impact resulting in the direct interaction of an activity with an environmental or ecological component. An indirect impact is defined as an impact on the environment which is not a direct result of a project or activity, often produced away from or as a result of a complex impact pathway.

iii. Effect definitions

1.3.22 The generic definitions of effect for terrestrial ecology and ornithology are set out within **Table 6.4** of **Volume 1, Chapter 6** of the **ES**.

1.3.23 Following the classification of an effect as presented in **Tables 6.3** and **6.4** of **Volume 1, Chapter 6** of the **ES**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. Under CIEEM guidelines (Ref. 1.29), the significance of effect on the IEF(s) has been determined based on the analysis of the factors that characterise the impact (**Table 1.5**). A significant effect is defined as *“an effect that either supports or undermines biodiversity conservation objectives for the IEFs or for biodiversity in general”*.

1.3.24 Using CIEEM guidelines (Ref. 1.29) and approach, significant effects are identified with regard to an appropriate geographical scale, using the following terms:

- significant at the international level;
- significant at the national level;
- significant at the regional level;
- significant at the county level;
- significant at the local level; and
- not significant.

- 1.3.25 To allow a consistent approach across all disciplines, the standard levels of significance defined in the CIEEM guidelines (Ref. 1.29) are set out in **Table 1.7**, alongside the equivalent definitions of effect used elsewhere in this **ES**. Therefore, as a deviation from the standard EIA methodology, minor effects identified within this chapter have been classified as significant at a local level.

Table 1.7: Summary and comparison of EIA and CIEEM based measures of significance of ecological effects.

Significance Following The CIEEM Guidelines	Equivalent Effect Categories And Significance Definitions Following The Standard EIA Methodology Presented Within Volume 1, Chapter 6
Significant at the international level	Major (= significant)
Significant at the national level	Major (= significant)
Significant at the regional level	Moderate (= significant)
Significant at the county level	Moderate (= significant)
Significant at the local level	Minor (= not significant)
Not significant	Negligible (= not significant)

j) Assessment methodology

i. Establishing the baseline

Existing baseline

- 1.3.26 Baseline conditions were determined through a combination of a desk study and field surveys. Technical data has been assimilated from survey work carried out between 2007 and 2019. A review was also conducted to determine any European and nationally designated sites located within specific Zol, as detailed within the respective volumes. Through this method, habitat and species of importance were identified and assessed.

- 1.3.27 The desk-study exercise comprised the following steps:

- identification of designated sites (statutory and non-statutory) including SPAs, SACs, Ramsar Sites, SSSIs, National Nature Reserves, Local Nature Reserves and CWSs;
- review of Suffolk Biodiversity Information Service and the Joint Nature Conservation Committee records; and

- a review of the Suffolk BAP 2012 (Ref. 1.24), Suffolk's Priority Species and Habitats list 2015 (Ref. 1.25), and Section 41 of the NERC Act 2006 (Ref. 1.13).

1.3.28 An extensive suite of ecological survey work was undertaken within the main development site and/or its immediate surrounds (i.e within the Zol) during the period 2007 to 2019. At the associated development sites, ecological surveys were also undertaken during this period, with all surveys for the Sizewell link road and the two village bypass being undertaken in the period 2018-2019. Full details of the baseline surveys (including the methodologies) are found within the terrestrial ecology and ornithology chapters in **Volumes 2 to 9** of the **ES**.

Future baseline

1.3.29 The future baseline considers any committed development(s) or forecasted changes (e.g. climate change) that would materially alter the terrestrial ecology and ornithology baseline conditions during the construction and operation, and removal and reinstatement (where relevant) of the Sizewell C Project. It also considered what the land use would be in the absence of the proposed development. Further information is provided within the terrestrial ecology and ornithology chapters in **Volumes 2 to 9** of the **ES**

1.3.30 Effects of climate change have been considered, where relevant. The overall effects of climate change on habitats and associated species are uncertain. The impacts that climate change may have on habitat types have been summarised on report cards produced by the Living with Environmental Change Network (Ref. 1.45) which have been reviewed and considered on a case by case basis.

ii. Assessment scenarios

1.3.31 The assessment of effects on terrestrial ecology and ornithology is based on the full construction, operation and removal and reinstatement (where relevant) phases and associated activities, rather than specific assessment years.

iii. Inter-relationships

1.3.32 For terrestrial ecology and ornithology, a number of inter-relationships and their effects have been considered on the different IEFs, where relevant. This has included consideration of potential impacts on IEFs arising from the introduction of, or changes to (list not exhaustive):

- noise;

- air quality;
- recreational disturbance; and
- groundwater and surface water.

k) Assumptions and limitations

1.3.33 Although every effort was made to undertake a rigorous impact assessment, a number of assumptions and limitations must be acknowledged. The following assumptions have been made in each assessment:

- The impact assessment is based on the prevailing ecological conditions which are not expected to change substantially in the absence of the Sizewell C Project. However, consideration of the potential future baseline has been made for each assessment section.
- For **Volume 2** of the **ES**, the baseline presented has been developed through the collation of surveys and supporting third-party information over a period of more than ten years. Collectively, the surveys were undertaken to good practice guidelines applicable at the time of the survey; a range of survey methodologies were undertaken to address limitations of any one survey type; and the nature of the site and surrounding areas has not materially changed during this period.

1.3.34 Various limitations were identified over the course of the EclA. These are generally specific to the relevant Sizewell C Project sites, and, therefore, have been detailed in the terrestrial ecology and ornithology chapters in **Volumes 2 to 9** of the **ES**.

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VOLUME 1, CHAPTER 6, APPENDIX 6K: AMENITY AND RECREATION LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1 Amenity and Recreation Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects of the Sizewell C Project on amenity and recreation. This appendix applies to all Sizewell C Project sites relating to amenity and recreation, unless otherwise indicated in the topic chapters of the site assessment volumes (**Volumes 2 to 9** of the **Environmental Statement (ES)** (Doc Refs. 6.3-10). Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant amenity and recreation effects associated with the Sizewell C Project as described in the following ES chapters:

- **Chapter 15** of **Volume 2** of the **ES** (Doc Ref. 6.3); and
- **Volumes 3 to 9, Chapter 8** of the **ES** (Doc Refs. 6.4-10).

1.1.3 The amenity and recreation assessments have been informed by data from other assessments and reports as follows:

- Transport (**Chapter 10** of **Volume 2** of the **ES**) (Doc Ref. 6.3).
- Noise and vibration (**Chapter 11** of **Volume 2** and **Volumes 3 to 9, Chapter 4** of the **ES**) (Doc Refs. 6.3-10).
- Air quality (**Chapter 12** of **Volume 2** and **Volumes 3 to 9, Chapter 5** of the **ES**) (Doc Refs. 6.3-10).
- Landscape and visual (**Chapter 13** of **Volume 2** and **Volumes 3 to 9, Chapter 6** of the **ES**) (Doc Refs. 6.3-10).
- Coastal geomorphology and hydrodynamics (**Chapter 20** of **Volume 2** of the **ES**) (Doc Ref. 6.3).
- Marine navigation (**Chapter 24** of **Volume 2** of the **ES**) (Doc Ref. 6.3).
- Lighting Management Plan (**Appendix 2B** of **Volume 2** of the **ES**) (Doc Ref. 6.3).

- Walk and Cycle strategy in the **Transport Assessment (Book 8)** (Doc Ref. 8.5).
- Rights of Way and Access Strategy (**Appendix 15I of Chapter 15, Volume 2 of the ES**) (Doc Ref. 6.3).
- Outline Landscape and Ecological Management Plan (**Book 8**) (Doc Ref. 8.2).
- Code of Construction Practice (**Book 8**) (Doc Ref. 8.11).

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant effects on amenity and recreation associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the amenity and recreation assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 There is no international legislation considered relevant to the assessment of amenity and recreation effects.

b) National

i. Legislation

The Countryside and Rights of Way Act 2000

1.2.4 The Countryside and Rights of Way Act 2000 (CRoW Act 2000) (Ref. 1.1) gives a public right of access to land mapped as 'open country' (mountain, moor, heath and down) or registered common land. These areas are known as 'Open Access Land'.

1.2.5 The CRoW Act 2000 also provides guidance on Public Rights of Way (PRoW) and definitive maps and statements, and rights of way improvement plans. Sections 60 and 61 places a duty of the local highway authority (i.e. Suffolk County Council (SCC)) to publish a rights of way improvement plan.

- 1.2.6 The amenity and recreation chapters include an assessment of the effects of the proposed development on people using definitive rights of way and Open Access Land.

Marine and Coastal Access Act 2009

- 1.2.7 The Marine and Coastal Access Act 2009 (Ref. 2.2) enables recreational access to the English and Welsh coast. The twin objectives are to:

- secure a route around the whole of the English coast (the England Coast Path); and
- secure an associated “margin” of land for the public to enjoy (the coastal margin).

ii. Policy

National Policy Statements

- 1.2.8 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.3) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.4). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

- 1.2.9 The NPSs set out the Government’s energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants’ assessments of the effects of their scheme, and how the decision maker should consider these impacts.

- 1.2.10 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1** and **Table 1.2**.

Table 1.1: Requirements of the National Policy Statement for Energy (EN-1)

Ref.	NPS topic requirement	How the requirement has been addressed
5.6.4	<i>“The applicant should assess the potential for ... artificial light to have a detrimental impact on</i>	The amenity and recreation chapters (Volumes 2 to 9) have considered the effects

Ref.	NPS topic requirement	How the requirement has been addressed
	<i>amenity, as part of the Environmental Statement.”</i>	of proposed artificial light within the assessment.
5.9.10	<i>“Development proposed within nationally designated landscapes consideration of such applications should include an assessment of: any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.</i>	The amenity and recreation Chapter 15 in Volume 2 and Chapter 8 in Volume 9 have considered the effects of the main development site and the green rail route on recreational opportunities within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) and mitigation. The AONB lies beyond the study areas of the other associated development sites and they would not affect recreational opportunities within the AONB.
5.10.16	<i>“In considering the impact on maintaining coastal recreation sites and features, the IPC should expect applicants to have taken advantage of opportunities to maintain and enhance access to the coast. In doing so the IPC should consider the implications for development of the creation of a continuous signed and managed route around the coast, as provided for in the Marine and Coastal Access Act 2009.”</i>	Proposals for the future England Coast Path during the construction and operation of the Sizewell C Project are described in the Rights of Way and Access Strategy in Appendix 15I of Chapter 15 of Volume 2 of the ES . The amenity and recreation chapter of the main development site (Chapter 15 of Volume 2 of the ES) has assessed the effects on potential future users of the England Coast Path.
5.10.24	<i>“Rights of way, National Trails and other rights of access to land are important recreational facilities for example for walkers, cyclists and horse riders. The IPC should expect applicants to take appropriate mitigation measures to address adverse effects on coastal access, National Trails and other rights of way. Where this is not the case the IPC</i>	Treatment of PRoW, National Trails and other publicly accessible land and routes within the main development site and green rail route site are described in the Rights of Way and Access Strategy in Volume 2 of Chapter 15 of Volume 2 of the ES . Temporary and permanent closures, diversions and creation of new PRoW for all sites are set out in the

Ref.	NPS topic requirement	How the requirement has been addressed
	<i>should consider what appropriate mitigation requirements might be attached to any grant of development consent."</i>	detailed Rights of Way plans (Doc Ref. 2.4) and in Schedule 10, 11 and 13 of the DCO drafting (Doc Ref. 3.1). The amenity and recreation chapters assess effects on users of these recreational resources (Volumes 2 to 9 of the ES).
5.11.1	<i>"Excessive noise can have wide-ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality."</i>	The amenity and recreation chapters (Volumes 2 to 9 of the ES) include an assessment of the effects arising from noise created by the Sizewell C Project.

Table 1.2: Requirements of the National Policy Statement for Nuclear Power Generation (EN-6)

Ref.	NPS topic requirement	How the requirement has been addressed
3.12.2	<i>"The Nuclear AoS noted that the sites listed in the NPS are on coastal or estuarine locations in rural areas and that there is therefore the potential for impact on land that has recreational and amenity value. ..."</i>	Proposals for the future England Coast Path, PRoW and other accessible routes and areas during construction and operation of the main development site and green rail route site are described in the Rights of Way and Access Strategy in Appendix 15I of Chapter 15 of Volume 2 of the ES . Temporary and permanent closures, diversions and creation of new PRoW for all sites are set out in the detailed Rights of Way plans (Doc Ref. 2.4) and in Schedule 10, 11 and 13 of the DCO drafting .
C.8.78	<i>"Some responses were concerned about coastal access and whether access to the heritage coastal path may be lost, and the effect this would have on the local tourist industry, particularly during the construction of the new nuclear power station. Section 5.10 of EN-1 (Land Use including open space, green infrastructure and green belt) sets out that rights of way, National Trails and areas of access to land (e.g. open access land) are important recreational facilities and that mitigation</i>	The amenity and recreation chapters (Volumes 2 to 9 of the ES) assess effects on potential future users of the England Coast Path and users of PRoW and other accessible routes and areas.

Ref.	NPS topic requirement	How the requirement has been addressed
	<i>measures should be considered by the applicant or the IPC as necessary. It also sets out the importance for consideration of coastal recreation and access to the coast. The IPC will consider the implications for development of the creation of a continuous signed and managed route around the coast, as set out in the Marine and Coastal Access Act 2009, using the guidance in EN-1. Possible mitigation measures might include siting certain elements of a station away from public footpaths and/or the provision of realignments to existing or planned rights of way."</i>	

UK Marine Policy Statement

- 1.2.11** The UK Marine Policy Statement (Ref. 1.5) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It was prepared and adopted for the purposes of section 44 of the Marine and Coastal Access Act 2009 (Ref. 1.2).
- 1.2.12** Paragraph 3.11.2 in Section 3.11 Tourism and Recreation states:
- "The sea can provide a variety of tourism and recreational opportunities. These will vary from area to area but will include pleasure boating, sailing, recreational diving (including diving on wrecks), sea angling, kayaking and surfing, as well as exploration of underwater and coastal heritage assets."*
- 1.2.13** Paragraph 3.11.5 goes on to say:
- "Marine plan authorities and decision makers should consider the potential for tourism and recreation in the marine environment and the benefits that this will bring to the economy and local communities. These activities, especially recreation, are likely to be varied and many will be closely linked to onshore tourism strategies and plans which will need to be taken into account...."*
- 1.2.14** Effects of the proposed main development site on offshore recreational receptors are considered in **Volume 2, Chapter 15** of the **ES**.

National Planning Policy Framework

- 1.2.15 The National Planning Policy Framework (NPPF) (Ref. 1.6) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Planning Act 2008 and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).
- 1.2.16 The NPPF makes clear that the purpose of planning is to help achieve sustainable development (Section 2), and promote healthy and safe communities including open space and recreation opportunities (Section 8), and that the recreational amenity value of tranquil areas (Section 15) is an important component of this.
- 1.2.17 Paragraph 91 states that:
- “Planning policies and decisions should aim to achieve healthy, inclusive and safe places which: ...*
- c) enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling.”*
- 1.2.18 Paragraph 98 states:
- “Planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails.”*
- 1.2.19 The amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) assess effects on users of recreational resources.
- 1.2.20 Paragraph 170 requires that decisions should contribute by:
- “...c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate; ...”*
- 1.2.21 Proposals for public access on the coast are described in the **Rights of Way and Access Strategy** in **Appendix 15I** of **Chapter 15** of **Volume 2** of the **ES**. The assessment of amenity and recreation effects in **Volume 2, Chapter 15** of the **ES** consider the effects of the Sizewell C main development site on users of the publicly accessible coast.
- 1.2.22 Paragraph 172 states that:

“Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to these issues. ... Planning permission should be refused for major development other than in exceptional circumstances, and where it can be demonstrated that the development is in the public interest. Consideration of such applications should include an assessment of: ...

c) any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.”

- 1.2.23 The amenity and recreation assessment chapters (see **Volumes 2 to 9** of the **ES**) assess effects on users of recreational resources within the Suffolk Coast and Heaths AONB and areas outside the AONB.

- 1.2.24 Paragraph 180 states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

...

c) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; ...”

- 1.2.25 Effects on tranquillity experienced by recreational receptors due to the Sizewell C Project are assessed in the amenity and recreation chapters (**Volumes 2 to 9** of the **ES**) as described in **section 1.3** of this appendix.

c) Regional

i. Policy

East Inshore and East Offshore Marine Plans

- 1.2.26 Marine plans, together with the Marine Policy Statement (Ref. 1.5), underpin the planning system for England’s seas. The East Inshore and East offshore Marine Plans (Ref. 1.7) provide an approach to managing the East Inshore and East Offshore areas, their resources, and the activities and interactions that take place within them.

- 1.2.27 Section 3.18 Tourism and Recreation recognises the importance of tourism and recreation to the local economy and social benefits for local communities such as improved health and well-being.

1.2.28 Policy TR1 states:

“Proposals for development should demonstrate that during construction and operation, in order of preference:

- a) they will not adversely impact tourism and recreation activities*
- b) how, if there are adverse impacts on tourism and recreation activities, they will minimise them*
- c) how, if the adverse impacts cannot be minimised, they will be mitigated*
- d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts”.*

1.2.29 Paragraph 472 supporting this policy states:

“This policy should ensure that the impacts of construction and operation on tourism and recreation are either avoided, minimised or mitigated. It will be implemented by the public authorities responsible for authorising such developments. This could mean consideration of:

- *construction being undertaken during the low season (autumn/winter) with consideration for over wintering mobile species (birds etc)*
- *the impacts to amenity through noise or light disturbance and the effect this will have on tourism, recreation and coastal communities*
- *the impacts to water quality and the local marine environment*
- *any navigational constraints for recreational activities which include the use of personal watercraft*
- *seascape (please refer to the seascape section – character and visual resource – for more information)*
- *any impacts on inshore fishing and the strong links it has with many popular coastal resorts”.*

1.2.30 Effects of the proposed main development site on marine based recreational receptors are considered in **Volume 2, Chapter 15** of the **ES**.

d) Local

i. Policy

1.2.31 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

1.2.32 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

1.2.33 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006) (Ref. 1.8); the Core Strategy and Development Policies Development Plan Document (2013) (Ref. 1.9); and the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref. 1.10).

1.2.34 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref. 1.11) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies

1.2.35 Chapter 3 of the Core Strategy and Development Management Policies (Ref. 1.8) sets out strategic policies. The following policies are relevant to the amenity and recreation assessment.

1.2.36 Strategic Policy SP13 – Nuclear Energy relates specifically to the possibility of additional nuclear power stations at Sizewell and the need to consider:

"...(e) Coastal access including the Heritage Coastal Walk; ...".

1.2.37 Strategic Policy SP15 – Landscape and Townscape refers to protected landscapes including the Suffolk Coast and Heaths AONB. In the supporting text, it states that the AONB and Heritage Coast are designated as being of national importance and that they will be protected, not only because of their visual qualities but also for their tranquillity and ambience, particularly relevant in the secluded parts of the coast (paragraph 3.153).

1.2.38 Effects on tranquillity experienced by recreational receptors caused by the Sizewell C Project are assessed in the amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) as described in **section 1.3** of this appendix.

1.2.39 Strategic Policy SP29 - The Countryside identifies the countryside as an important economic, social and environmental asset within the district which is important to sustain. The supporting text identifies the importance of associated leisure and recreational uses within of the countryside, contributing to it being an attractive destination for tourists.

1.2.40 Effects on users of recreational resources within the countryside are assessed in the amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**).

1.2.41 Development Management Policy DM26 – Lighting states:

“The District Council will seek to minimise light pollution. Applications for development requiring or likely to require external lighting should include details of lighting schemes. This should include position, height, aiming points, lighting levels and a polar luminance diagram. Applicants will need to satisfy the District Council that:

(a) The proposed lighting scheme is the minimum needed for security, working purposes, recreational or other use of the land;

(b) It is designed so as to minimise pollution from glare and light spillage, particularly to residential and commercial areas, areas of nature conservation importance, and areas whose open and landscape qualities would be affected; and

(c) There will be no glare or light spillage onto highways which could dazzle, distract or disorientate road users using them.”

1.2.42 It adds

“In order to prevent unnecessary intrusion into the countryside, or the effect on residential amenity, the District Council may seek to control the days and times of use of lighting (excluding street lighting).”

1.2.43 Where appropriate, the amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) consider effects of lighting as part of the assessments.

Suffolk Coastal District Council Final Draft Local Plan

1.2.44 The following policies contained within the Final Draft Local Plan (Ref. 1.11) are relevant to the amenity and recreation chapters.

1.2.45 Draft policy SCLP7.1: Sustainable Transport states that:

“Development proposals should be designed from the outset to incorporate measures that will encourage people to travel using non-car modes to access home, school, employment, services and facilities.

Development will be supported where: ...

c) It is well integrated into and enhances the existing cycle network including the safe design and layout of new cycle routes and provision of covered, secure cycle parking;

d) It is well integrated into, protects and enhances the existing pedestrian routes and the public rights of way network; ...”

1.2.46 Draft policy SCLP10.3: Environmental Quality states that:

“Development proposals will be expected to protect the quality of the environment and to minimise and, where possible, reduce all forms of pollution and contamination.

Development proposals will be considered in relation to impacts on:

a) Air quality ...

e) Light pollution; and

f) Noise pollution.

Proposals should seek to secure improvements in relation to the above where possible”.

1.2.47 Draft policy SCLP10.4: Landscape Character states that:

“Development proposals will be expected to demonstrate their location, scale, form, design and materials will protect and enhance: ...

e) The growing network of green infrastructure supporting health, wellbeing and social interaction. ...

Proposals should include measures that enable a scheme to be well integrated into the landscape and enhance connectivity to the surrounding green infrastructure and Public Rights of Way network....

Proposals for development should protect and enhance the tranquillity and dark skies across the District. Exterior lighting in development should be appropriate and sensitive to protecting the intrinsic darkness of rural and tranquil estuary, heathland and river valley landscape character.”

1.2.48 The amenity and recreation assessments in **Volumes 2 to 9** of the **ES** include potential changes to air quality, light pollution, noise and tranquillity that could be caused by the Sizewell C Project.

e) **Guidance**

1.2.49 This amenity and recreation assessment has been undertaken in accordance with the following guidance documents.

i. National

Planning Practice Guidance

- 1.2.50 The Planning Practice Guidance (PPG) (Refs. 1.12 to 1.15) is a web-resource to support the NPPF (Ref. 1.6). It includes guidance relating to numerous topics, with sections relevant to amenity and recreation matters including the natural environment; noise; open space, sports and recreational facilities, PRoW and local green space; and light pollution. The key aspects of these section relevant to the amenity and recreation assessment are summarised below.

Natural Environment 2019

- 1.2.51 The Natural Environment section of the PPG (Ref. 1.12) provides guidance on green infrastructure, highlighting types of green infrastructure (including include parks, playing fields, other areas of open space) (paragraph 004) and the benefits which they provide (paragraph 005), including promoting healthy and safe communities stating that:

“Green infrastructure can improve the wellbeing of a neighbourhood with opportunities for recreation, exercise, social interaction, experiencing and caring for nature, community food-growing and gardening, all of which can bring mental and physical health benefits. Outdoor Recreation Value (ORVal) is a useful online tool that can be used to quantify the recreational values provided by greenspace. Green infrastructure can help to reduce health inequalities in areas of socio-economic deprivation and meet the needs of families and an ageing population....” (paragraph 006).

- 1.2.52 It states further that:

“Green infrastructure opportunities and requirements need to be considered at the earliest stages of development proposals, as an integral part of development and infrastructure provision, and taking into account existing natural assets and the most suitable locations and types of new provision.” (parahraph 008)

- 1.2.53 Proposals for alterations and improvements to PRoW, National Trails and other publicly accessible land and routes are described in the **Rights of Way and Access Strategy** in **Appendix 15I** of **Chapter 15** of **Volume 2** of the **ES**.

- 1.2.54 The amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) assess effects on users of these recreational resources, which are an important component of green infrastructure.

Noise 2019

- 1.2.55 The Noise section of the PPG (Ref. 1.13) describes factors that are relevant if seeking to identify areas of tranquillity stating:

“For an area to justify being protected for its tranquillity, it is likely to be relatively undisturbed by noise from human sources that undermine the intrinsic character of the area. It may, for example, provide a sense of peace and quiet or a positive soundscape where natural sounds such as birdsong or flowing water are more prominent than background noise, e.g. from transport. Consideration may be given to how existing areas of tranquility could be further enhanced through specific improvements in soundscape, landscape design (e.g. through the provision of green infrastructure) and/or access.” (paragraph 008).

- 1.2.56 Effects on tranquillity experienced by recreational receptors due to the Sizewell C Project are assessed in the amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) as described in **section 1.3** of this appendix.

Open space, sports and recreation facilities, public rights of way and local green space 2014

- 1.2.57 This section of the PPG (Ref. 1.14) states that:

“Open space should be taken into account in planning for new development and considering proposals that may affect existing open space (see National Planning Policy Framework paragraph 96). Open space, which includes all open space of public value, can take many forms, from formal sports pitches to open areas within a development, linear corridors and country parks. It can provide health and recreation benefits to people living and working nearby; have an ecological value and contribute to green infrastructure (see National Planning Policy Framework paragraph 171, as well as being an important part of the landscape and setting of built development, and an important component in the achievement of sustainable development (see National Planning Policy Framework paragraphs 7-9).” (paragraph 001.)

- 1.2.58 Proposals for alterations and improvements PRoW, National Trails and other publicly accessible recreation areas and routes are described in the **Rights of Way and Access Strategy** in **Appendix 15I** of **Chapter 15** of **Volume 2** of the **ES**.

- 1.2.59 The amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) assess effects on users of these outdoor recreational resources.

Light Pollution 2019

- 1.2.60 The Light Pollution section of the PPG (Ref. 1.15) sets out the circumstances in which light pollution can become relevant to planning, stating *“Artificial light is not always necessary. It has the potential to become what is termed ‘light pollution’ or ‘obtrusive light’, and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife and undermine enjoyment of the countryside or the night sky, especially in areas with intrinsically dark landscapes. Intrinsically dark landscapes are those entirely, or largely, uninterrupted by artificial light. National parks and nature reserves can serve as good examples, particularly where they support habitats for native nocturnal animals.*

Lighting schemes can also be costly and difficult to change, so getting the design right and setting appropriate conditions at the planning stage is important. In particular, some types of premises (including prisons, harbour premises, airports and transport depots where high levels of light may be required for safety and security reasons) are exempt from the statutory nuisance regime for artificial light, so it is even more important to get the lighting design for these premises right at the outset.” (paragraph 001).

- 1.2.61 The guidance continues at paragraph 003 stating that:

“Light intrusion occurs when the light ‘spills’ beyond the boundary of the area being lit. For example, light spill can result in safety impacts related to the impairment or distraction of people (e.g. when driving vehicles), health impacts arising from impaired sleep, cause annoyance to people, compromise an existing dark landscape and/or adversely affect natural systems (e.g. plants, animals, insects, aquatic life). These adverse effects can usually be avoided with careful lamp and luminaire selection and positioning:

Lighting near or above the horizontal is usually to be avoided to reduce glare and sky glow (the brightening of the night sky).

Good design, correct installation and ongoing maintenance are essential to the optical effectiveness of lighting schemes such as fixed and/or regularly operated functional and decorative lighting elements.

In combination with optical good practice aimed at limiting light pollution, efficient lamp and luminaire selection are important considerations to minimise energy use and associated carbon emissions.”

- 1.2.62 Paragraph 005 adds *“Consideration of how much light shines may include an assessment of the quantitative and spectral attributes of the lighting scheme (eg light source and performance levels) and whether it exceeds the levels required to fulfil its intended purpose. Consideration can also be given to whether the proposed lighting is purely for decorative purposes as*

opposed to being needed for functional reasons such as security. The character of the area and the surrounding environment may affect what will be considered an appropriate level of lighting for a development. In particular, lighting schemes for developments in protected areas of dark sky or intrinsically dark landscapes need to be carefully assessed as to their necessity and degree.”

- 1.2.63 Where appropriate the amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) have considered the effects of lighting as part of the assessments.

ii. **Regional and Local**

Suffolk Green Access Strategy DRAFT – Rights of Way Improvement Plan

- 1.2.64 The draft Suffolk Green Access Strategy (Ref. 1.16) was published for public consultation from 8 July 2019 to 20 September 2019. The consultation will provide SCC with final feedback before the plan is presented to cabinet for adoption by SCC. The draft document has been reviewed and taken account of in the amenity and recreation assessment.
- 1.2.65 The draft Suffolk Green Access Strategy includes the Rights of Way Improvement Plan that SCC has a duty to prepare under the CRow Act 2000 (Ref. 1.1). The draft strategy states that it replaces the previous Rights of Way Improvement Plan which ran from 2006 to 2016.
- 1.2.66 The draft Suffolk Green Access Strategy reviews the achievements of the previous Rights of Way Improvement Plan, then sets out objectives and actions for the rights of way and access network for a further ten years.
- 1.2.67 Part 3 of the strategy sets out the delivery plan under four key themes which were identified from public consultation:
- 1. Managing green access infrastructure;
 - 2. Improving green access infrastructure;
 - 3. Promoting green access; and
 - 4. Developing healthy and sustainable communities.
- 1.2.68 The delivery plan sets high level actions rather than specific geographically identified projects. One action of the delivery plan is to “*Obtain significant public rights of way improvements and legacies on nationally important development projects, such as Sizewell C and East Anglia Wind Farm developments.*” (Page 36.) The draft Suffolk Green Access Strategy does not

provide information on any specific improvements or projects related to the Sizewell C Project.

[Suffolk Coast and Heaths Area of Outstanding Natural Beauty Management Plan 2018-2023](#)

- 1.2.69 The Suffolk Coast and Heaths Area of Outstanding Natural Beauty Management Plan 2018-2023 (Ref. 1.17) includes specific objectives to maintain and enhance PRoW and wider access networks across the AONB. It introduces the special qualities of the AONB landscape as those attributes of an area that may contribute to an appreciation of natural beauty, including, under the heading Health and Social Wellbeing, the extensive network of PRoW, Open Access Land and permissive routes which provide excellent opportunities for recreation. The Management Plan sets out a 20-year vision of the AONB in 2038 stemming from the primary aim which is to conserve and enhance natural beauty. One of the objectives for 2038 is that tranquillity is retained and undesirable intrusion prevented. The amenity and recreation chapters (see **Volumes 2 to 9** of the **ES**) have assessed the effects of users of the network of PRoW, Open Access Land and permissive routes, including effects on tranquillity.

[Suffolk Coast and Heaths Area of Outstanding Natural Beauty Natural Beauty and Special Quality Indicators](#)

- 1.2.70 This Suffolk Coast and Heaths Area of Outstanding Natural Beauty Natural Beauty and Special Quality Indicators (Ref. 1.18) sets out the Natural Beauty and Special Qualities of the AONB. The document has been produced by SZC Co., as part of their preparatory work for the proposed Sizewell C Project, in consultation and agreement with the Suffolk Coast and Heaths AONB Partnership, Suffolk Coastal District Council and Suffolk County Council. Factors including scenic quality and relative tranquillity are identified as Natural Beauty Indicators of the AONB. The document informs the amenity and recreation assessment chapters (see **Volumes 2 to 9** of the **ES**) and is included in **Volume 2, Appendix 13C** of the **ES**.

[Suffolk Coast and Heaths Area of Outstanding Natural Beauty Position Statement-Obtrusive Lighting in the Suffolk Coast and Heaths Area of Outstanding Natural Beauty](#)

- 1.2.71 The Suffolk Coast and Heaths Area of Outstanding Natural Beauty Position Statement-Obtrusive Lighting in the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (Ref. 1.19), endorsed by the Suffolk Coast and Heaths AONB Partnership, provides guidance to local planning authorities, landowners and other interested parties regarding lighting in the AONB. The amenity and recreation assessment chapters (see **Volumes 2 to 9** of the **ES**) consider the effects of proposed artificial light.

Suffolk Access Principles for Sizewell C

- 1.2.72 The Suffolk Access Principles for Sizewell C (Ref. 1.20) is one of six ‘Sizewell C design principles’ documents that have been endorsed by the Sizewell C Joint Local Authority Group comprising East Suffolk Council and Suffolk County Council. The document states that *“The Access Principles set out the local authorities’ views on the range of access-related issues associated with the proposed development of Sizewell C and highlight the objectives that should be satisfied in the resolution of these issues. ...”*. Under the heading “Objectives” it states that *“To minimise the direct impact of the development on linear and non-linear, formal and informal access users¹ in the vicinity of the development during the construction phase, particularly by ensuring any necessary diversions meet the best interests of access users in respect of directness and quality, and ensure any closures of linear and non linear.”*
- 1.2.73 It provides further objectives and principles that are discussed in the relevant amenity and recreation chapters in **Volumes 2 to 9** of the **ES**.
- 1.3 **Methodology**
- a) **Scope of the assessment**
- 1.3.1 The generic EIA methodology is described in **Chapter 6** of this volume (Doc Ref. 6.2).
- 1.3.2 This section provides a summary of the amenity and recreation assessment methodology. The scope of assessment considers the impacts of the construction, and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific additions to the methodology for amenity and recreation are described within the relevant chapter of **Volumes 2 to 9** of the **ES**.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume (Doc Ref. 6.2).
- 1.3.5 The amenity and recreation impact assessments consider effects of the Sizewell C Project on users of PRoW, permissive footpaths, long distance

¹ “Linear meaning rights of way or permissive paths; non-linear meaning open space, including beaches; formal meaning access with a statutory basis; informal meaning permissive access granted by landowners”

recreational routes, cycle routes and accessible open spaces such as (inter alia) common land, the beach, nature reserves, sports facilities and water bodies.

- 1.3.6 There is no specific or general guidance on amenity and recreation impact assessment. The agreed methodology and study areas are informed by professional experience, review of other projects and through discussion with relevant consultees. The assessment considers physical changes to resources, changes to the numbers of people using resources, and changes to the amenity experience of people using resources. Further detail is provided in the following sections.

i. **Physical changes to recreational resources**

Onshore resources

- 1.3.7 A number of physical changes would be made to outdoor recreational resources including PRow and permissive footpaths requiring stopping up, temporary or permanent diversions. Physical changes would affect the ability of people to use recreational resources, whether they would have to use alternative routes or resources, and their experience of using the resources. For example, a PRow that currently crosses an arable field may have a new rail route and crossing constructed across the PRow, or people using a bridleway may be temporarily diverted during the construction phase and the alignment and surfacing of the temporary and permanent bridleway route may change.

Offshore resources

- 1.3.8 Offshore recreational receptors may need to avoid areas they currently use to avoid craft, structures or exclusion zones related to the Sizewell C Project. This would include local temporary changes to recreational craft movement to avoid marine traffic approaching and departing from the Beach Landing Facility (BLF) and vessels associated with construction of the cooling water infrastructure, and longer-term changes to avoid temporary exclusion zones or operational structures, such as the cooling water intake and outfall head structures.

ii. **Potential for additional recreational use of routes and access areas due to the construction of the Sizewell C Project**

- 1.3.9 The construction of the Sizewell C Project has the potential to lead to additional recreational use of linear routes and area access due to:
- the displacement of existing users of informal outdoor recreational resources to alternative informal outdoor recreational resources, who

wish to avoid the area around Sizewell C due to the disturbance caused by construction activities;

- people working on the construction of the Sizewell C Project who would be living or staying in the area, who may visit outdoor recreational resources; and
- potential for additional users attracted to recreational resources to view the construction site / activity.

1.3.10 These effects area assessed in the main development site chapter **Volume 2 Chapter 15** of the **ES**.

[Potential for additional recreational use due to the displacement of existing users of recreational resources](#)

1.3.11 Surveys undertaken in 2014 and 2015 (**Appendix 15A** and **15B** of **Chapter 15** of **Volume 2** of the **ES** (Doc Ref. 6.3)) provide a detailed assessment of the likely displacement of recreational users in response to construction of the Sizewell C main development site. The results of these surveys are used to inform conclusions on the potential for displacement, including identifying locations to where people are most likely to displace and the potential for this to affect the experience of receptors currently using those resources. This is assessed in **Volume 2, Chapter 15** of the **ES**.

[Potential for additional recreational use by construction workers](#)

1.3.12 **Chapter 3** and **Chapter 9** of **Volume 2** of the **ES** (Doc Ref. 6.2) describe the construction workforce required to build and operate the Sizewell C Project, and highlights the aspects of this workforce in terms of its size, its level of net additional population in the area, the type of accommodation and location of temporary residence and the demographic characteristics, all of which help to identify the level to which workers are likely to influence the numbers of visitors to outdoor recreational resources. The effects of these additional numbers on amenity and recreation is assessed in **Chapter 15** of **Volume 2** of the **ES** where further detail on the construction workforce is provided.

[Potential for additional users attracted to recreational resources to view the construction site / activity](#)

1.3.13 This is addressed in **Chapter 15** of **Volume 2** of the **ES**.

iii. [Effects on views, noise, or air quality](#)

1.3.14 The Sizewell C Project has potential to affect the amenity experienced by users or recreational resources due to perceptual or actual changes to views,

noise, or air quality. These effects have been assessed drawing on the following assessments:

- Transport (**Chapter 10** of **Volume 2** of the **ES**);
- Noise and Vibration (**Chapter 11** of **Volume 2** and **Volumes 3 to 9**, **Chapter 4** of the **ES**),
- Air Quality (**Chapter 12** of **Volume 2** and **Volumes 3 to 9**, **Chapter 5** of the **ES**);
- Landscape and visual (**Chapter 13** of **Volume 2** and **Volumes 3 to 9**, **Chapter 6** of the **ES**);
- Coastal geomorphology and hydrodynamics (**Chapter 20** of **Volume 2** of the **ES**); and
- Marine navigation (**Chapter 24** of **Volume 2** of the **ES**).

1.3.15 The principal effects on amenity and recreation would occur during the daytime when the use of recreational resources is at its greatest. Recreational amenity in the hours of darkness may also be affected by lighting from the proposed development; however, most recreational resources are less likely to be used after dark. There are however certain locations where people go to view dark skies at night, and these are assessed in **Chapter 15** of **Volume 2** of the **ES**.

b) Consultation

1.3.16 The scope of the assessment has been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co.'s responses are detailed in **Table 1.3**. Specific comments on the assessment of the main development site and associated developments are included within the respective ES volumes, where relevant.

Table 1.3: Summary of consultation responses that have informed the scope and methodology of the amenity and recreation assessment

Consultee	Date	Summary of discussion/ comments
SCC, SCDC, Natural England.	7 December 2015 (Meeting).	Consultees felt that further consideration and justification of the proposed offshore study area was required. EDF advised that offshore consultees would be consulted on the offshore study area. [The offshore study area was agreed at the meeting on 3 April 2019 described below in this table.]

NOT PROTECTIVELY MARKED

Consultee	Date	Summary of discussion/ comments
SCC, SCDC.	7 December 2015 (Meeting).	SCC and SCDC's written response following the meeting on 7 December 2015 questioned how the assessment of geographical extent would work in relation to footpath severance. Additional text has been added to the method in section 1.3 i) of this Appendix to describe how this is addressed in the assessment.
SCC, SCDC.	7 February 2019 (meeting). 13 March 2019 (written response).	SZC Co.'s approach to assessing tranquillity was presented at the meeting with consultees (SCC, SCDC, Natural England and the Suffolk Coast and Heaths AONB Partnership) on 7 February 2019. SCC and SCDC's written response following the meeting stated <i>"We stress that tranquillity is an important factor for amenity and recreation impacts which should be considered for areas within and outside of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty."</i> Effects on tranquillity of users of recreational resources is assessed within the amenity and recreation assessment chapters of Volumes 2 to 9 of the ES , informed by other topics including noise, visual effects and air quality.
Suffolk Coast and Heaths AONB Partnership.	8 February 2019 and 3 May 2019.	On 8 February 2019 the Suffolk Coast and Heaths AONB Partnership provided commentary on the assessment of tranquillity within the assessment. LDA Design replied on 3 May 2019. Effects on tranquillity of users of recreational resources is assessed within the amenity and recreation assessment chapters, informed by other topics including noise, visual effects and air quality.
SCC, SCDC.	13 th March 2019 (written response to meeting on 7 February 2019).	SCC and SCDC requested further detail be included in the Method Report regarding the potential for additional users attracted to parts of the network and other locations to view the construction site/activity.
Scottish Power, the Royal Yachting Association (RYA), the Cruising Association, Sizewell Residents Association.	3 April 2019 (Meeting).	Offshore consultees agreed to the 8km offshore study area. The 8km offshore study area was also confirmed in the updated EIA Scoping Report (2019), Appendix 6A of this volume.
SCC	3 September 2019	SCC agreed that the visitor surveys undertaken at the main development site in 2014, RSPB Minsmere in 2015, and the green rail route and Regional Cycle Route 42 (the main development site) in 2016 and 2018 were sufficient and that surveys at other associated development sites were not necessary. These surveys are included in Appendices 15A, 15B and 15C of Chapter 15 of Volume 2 of the ES .

c) Study areas

1.3.17 A description of the general principles of how the study areas have been established is summarised in this section. The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the amenity and recreation chapters of the relevant volumes (**Volume 2 to 9** of the **ES**).

i. Main development site

1.3.18 The onshore and offshore study areas were established and agreed with statutory consultees.

1.3.19 The onshore study area is to the outer edge of the Buffer Zone shown on **Figures 15.2 and 15.3** in **Volume 2, Chapter 15** of the **ES**, comprising:

- 8km offset from the site boundary. This is the area within which there are likely to be effects on amenity and recreation receptors caused by physical changes to resources, and to their experience due to changes in views, noise, air quality and traffic and due to additional people using recreation resources; and
- beyond this 8km offset specific locations may be identified within the Buffer Zone, informed by questionnaire survey results (included in **Appendices 15A and 15B** of **Chapter 15** of **Volume 2** of the **ES**) and analysis of the predicted construction workforce, where significant numbers of additional people are likely to recreate, affecting the recreational experience of existing users of resources at those locations. Onshore it varies from approximately 12.5km to 17km from the site boundary.

1.3.20 The offshore study area is 8km from the onshore site boundary as shown on **Figure 15.8** in **Volume 2, Chapter 15** of the **ES** which captures the majority of cruising and recreational vessels that travel off the east coast in the vicinity of the main development site, and it is considered that this area will capture all potentially significant effects.

1.3.21 Further information on the process through which the study area was established is described in **Volume 2, Chapter 15** of the **ES**.

ii. Associated development sites

1.3.22 A 1km study areas were agreed with statutory consultees (SCC, SCDC, Suffolk Coast and Heaths AONB Partnership, Suffolk Local Access Forum (SLAF) and Natural England) for the following associated development sites:

- northern park and ride at Darsham (**Volume 3, Chapter 8** of the **ES** (Doc Ref. 6.4));
- southern park and ride at Wickham Market (**Volume 4, Chapter 8** of the **ES** (Doc Ref. 6.5));
- two village bypass (**Volume 5, Chapter 8** of the **ES** (Doc Ref. 6.6));
- Sizewell link road (**Volume 6, Chapter 8** of the **ES** (Doc Ref. 6.7));
- freight management facility (**Volume 8, Chapter 8** of the **ES** (Doc Ref. 6.8)); and
- rail proposals (**Volume 9, Chapter 8** of the **ES** (Doc Ref. 6.10)).

1.3.23 A 0.5km study area was agreed with statutory consultees (SCC, SCDC, Suffolk Coast and Heaths AONB Partnership, Suffolk Local Access Forum (SLAF) and Natural England) for Yoxford roundabout and other highway improvements (**Volume 7, Chapter 8** of the **ES** (Doc Ref. 6.8)), due to the relatively small scale of works proposed.

d) Assessment scenarios

1.3.24 The amenity and recreation assessment considers the entire construction and operational phases, for the Sizewell C Project, and removal and reinstatement phase where relevant, rather than specific assessment years.

e) Assessment criteria

1.3.25 As described in **Chapter 6** of this volume, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. The significance of effect is a function of the sensitivity of the receptor and the magnitude of impact.

1.3.26 The key terms used within the amenity and recreation assessment are:

- value and susceptibility – which contribute to sensitivity of a receptor;
- scale, duration and extent - which contribute to the magnitude of impact; and
- significance of effect.

1.3.27 A summary of the assessment criteria used in the amenity and recreation assessment is presented in the following sub-sections.

i. Sensitivity

1.3.28 **Sensitivity:** sensitivity of the receptor is rated within the range of high, medium, low, very low and is assessed by combining considerations of value and susceptibility to the proposed development.

1.3.29 **Value:** value is a function of the value attached to the resource that is being used by the receptors by society which may be recognised by its status at a national, regional or local level (e.g. a National or Regional Trail, or the local PRoW network, which are all valued amenity and recreation resources but at different levels (national, regional or local)).

1.3.30 **Susceptibility:** The susceptibility of an amenity and recreation receptor is influenced by the likely activities or expectations of people using resources; the degree to which those activities and expectations may be unduly affected by the proposed form of change; the nature of the landscape or seascape in which the receptor is located; and the existing noise and air quality environment. This takes into account the existing tranquillity.

1.3.31 The assessment of sensitivity has been formed by professional opinion, with reference to the criteria set out in **Table 1.4**.

Table 1.4: Assessment of the sensitivity of receptors for amenity and recreation

Sensitivity	Description
High	<p>Value: Receptors using a resource that is recognised at the national level for recreation. For example, a footpath of national significance (a National Trail), which draws people nationally for amenity and recreation purposes, routes or open access areas that draw people nationally to experience the special qualities of a nationally designated or defined landscape (AONB or Heritage Coast). For instance, Sandlings Walk is of High Value because it is promoted nationally and it runs along most of the length of the Suffolk Coast and Heaths AONB.</p> <p>Susceptibility: Receptor has a very low capacity to accommodate the proposed form of change.</p>
Medium	<p>Value: Receptors using a resource that is recognised at the regional or district level for recreation, or resources which lie within a landscape regionally or locally designated for reasons including its recreational value. For example, a footpath of regional significance (a regional trail, long distance walking routes that are not National Trails), which draws people regionally for amenity and recreation purposes, routes or open access areas that draw people to experience the special qualities of a regionally or locally designated landscape. Accessible public open space, heritage assets, designated wildlife sites and nature reserves</p>

Sensitivity	Description
	where amenity is an important contributor to the experience, drawing people from the regional or district area. Susceptibility: Receptor has a low capacity to accommodate the proposed form of change.
Low	Value: Receptors using a resource that is appreciated by the local community but has little or no wider recognition of its value for recreation. Routes, accessible public open space, heritage assets, designated wildlife sites and nature reserves where amenity is a contributor to the experience, drawing people from the local area. Susceptibility: Receptor has some tolerance to accommodate the proposed form of change.
Very low	Value: Receptors using a resource that is degraded and with little or no evidence of being valued by the community for recreation. Susceptibility: Receptor is generally tolerant and can accommodate the proposed form of change.

1.3.32 Assessments of susceptibility and value may be different and professional judgement will always be used to conclude on the judgement of sensitivity. For example, value may be high and susceptibility may be low, and a professional judgement will be made to determine whether sensitivity is high, low or in between, supported by narrative explanation.

ii. Magnitude

1.3.33 **Magnitude** of impact is based on the impact that the Sizewell C Project would have upon the amenity and recreation receptor. It is assessed within the range of high, medium, low, very low with consideration given to scale, duration and extent of impact with reference to the following criteria:

1.3.34 **Scale** of impact identifies the degree of change which would arise from the development. It is rated on the following scale:

- large – total or major alteration to the ability to perform the amenity and recreation activity, or to the amenity and recreation experience, due to physical changes to the resource, or changes to views, noise, air quality and tranquillity, such that during and post development the baseline situation will be fundamentally changed.
- medium - partial alteration to the ability to perform the amenity and recreation activity, or to the amenity and recreation experience, due to physical changes to the resource, or changes to views, noise, air quality and tranquillity, such that during and post development the baseline situation will be noticeably changed.

- small – minor alteration to the ability to perform the amenity and recreation activity, or to the amenity and recreation experience, due to physical changes to the resource, or changes to views, noise, air quality and tranquillity, such that during and post development the baseline situation will be largely unchanged despite discernible differences.
- negligible – very minor alteration to the ability to perform the amenity and recreation activity, or to the amenity and recreation experience, due to physical changes to the resource, or changes to views, noise, air quality and tranquillity, such that during and post development the baseline situation will be fundamentally unchanged with barely perceptible differences.

1.3.35 **Duration** of impact identifies the time period over which the change to the receptor as a result of the development would arise. It is rated on the following scale:

- Permanent – the change is expected to be permanent and there is no intention for it to be reversed. Or occurring for a period longer than 25 years.
- Long-term – the change is expected to be in place for in the order of 10-25 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.
- Medium-term – the change is expected to be in place for in the order of 2-10 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.
- Short-term – the change is expected to be in place for in the order of less than 2 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.

1.3.36 Short, medium and long-term predominantly relate to the construction phase of the Sizewell C Project (and are therefore largely temporary impacts), and longer-term occurring for a period longer than 25 years relates to the operation of the Sizewell C Project (and are therefore largely permanent impacts).

1.3.37 **Extent** of impact indicates the geographic area of the resource used by the receptors over which the impacts will be felt. This is rated as follows:

- Limited – small part of a receptor area (less than 10%).

- Localised – part of receptor area (more than 10% but up to 25%).
- Intermediate – approximately half of receptor area.
- Wide – more than half of receptor area.

1.3.38 The degree to which each of the three criteria of scale, duration and extent influence the assessment of magnitude will be weighed by professional judgement and clearly described. It is not a straightforward matter of applying a one third weighting to each criterion. For example, scale and extent may be given different weighting in the two following scenarios applied to the same 5km long PRoW.

- A 5km long PRoW may not be physically affected by the proposals, but people using it may be affected by large scale impacts due to changes to views and noise for over half of its length (wide extent).
- Or, a 5km long PRoW may be blocked and 0.5km length of it diverted (large scale), affecting approximately 10% of the route (limited extent), and there be no other effects on users of the route.

1.3.39 In weighing up the criteria that lead to the assessment of magnitude of impact, it might be concluded that the second scenario leads to greater impacts than the first scenario, even though the extent of large scale impacts is less. This might be concluded because the scale of change (the diversion) is the main factor leading to the conclusion on the magnitude of impact, and is given greater weight than the extent of impact. The magnitude of impact on each receptor or receptor group will, therefore, be assessed based on the type and nature of change that is likely to occur (giving appropriate and proportional weighting to scale, duration and extent) and a professional judgement made.

iii. Effect definitions

1.3.40 Following the assessment of the sensitivity of the receptor and magnitude of impacts, effects are assessed by professional judgement with reference to the matrix shown **Table 1.5**.

Table 1.5: Classification of effects

		Sensitivity of receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate

		Sensitivity of receptor			
		Very Low	Low	Medium	High
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

1.3.41 The definition of these effects is provided in **Table 1.6**.

Table 1.6: Definition of Effects

Effect	Description
Major	Effects, both adverse and beneficial, which are likely to be important considerations at a national to regional level because they contribute to achieving national/regional objectives, or, which are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Effects which are likely to be important considerations at a regional and local level.
Minor	Effects that could be important considerations at a local level.
Negligible	Effects that are likely to have negligible or neutral influence, irrespective of other effects.

1.3.42 Professional judgement has been used to determine the classification of effect, and is reliant upon the interpretation of desk study and field survey, the assessment of magnitude of potential impacts, and whether the effect is considered to be significant or otherwise.

1.3.43 Effects are defined as adverse, neutral or beneficial. Neutral effects are those which overall are neither adverse or beneficial, but may incorporate a combination of both. The decision regarding the definition of effect and the decision regarding whether an effect is adverse, neutral or beneficial are entirely separate. For example, a rating of major and beneficial would indicate an effect that was of great significance and on balance beneficial, but not necessarily that the proposals would be extremely beneficial.

1.3.44 Effects that are negligible will typically be classed as neutral given that it indicates a very limited change.

1.3.45 Following the classification of an effect, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant, moderate-minor and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

1.3.46 Where intermediate ratings are given, e.g. 'moderate-minor', this indicates an effect that is both less than moderate and more than minor, rather than one which varies across the range. In such cases, the higher rating will

always be given first; this does not mean that the impact is closer to that higher rating, but is done to facilitate the identification of the more significant effects within tables. Intermediate judgements may also be used for judgements of scale and magnitude.

iv. Tranquillity

- 1.3.47 The effect on tranquillity experienced by amenity and recreation receptors is one of the factors that is considered when assessing impacts on amenity and recreation in **Chapter 15 of Volume 2**, and **Chapter 8 of Volumes 3 to 9** of the **ES**.
- 1.3.48 Tranquillity is not absolute and is relative to people's expectations in a particular location. This is explained in the Landscape Institute's technical note on tranquillity: *"A distinction is made between absolute tranquillity and relative tranquillity. When we refer to tranquillity in the UK, it is therefore almost always relative tranquillity that we are referring to, but in differing degrees. For instance, the tranquillity promoted by a summer sunrise on a calm day on top of a high mountain may be close to absolute, with almost no disturbance of any kind detracting from that state of mind. Yet the benefit to people of the relative tranquillity in an urban greenspace may be very high, despite intrusion from background traffic noise or the presence of many other people. Both sorts are important to recognise and value, but for different reasons, the commonality being the achievable state of mind rather than the environmental setting."* (Ref. 1.21)
- 1.3.49 There is no nationally recognised standard method for assessing or measuring tranquillity and it is not an absolute quality that can be measured easily. It is subjective and will be perceived differently by different people at any particular location and moment in time. Tranquillity can also vary over time; for example it will be less tranquil when a low flying aircraft passes overhead. It is influenced by a number of inter-related factors including the level and character of sound, the nature of views, the presence of absence of people and their behaviour, smells and clean air, how safe or comfortable people feel, and people's expectations at a particular location.
- 1.3.50 In order to assess tranquillity in relation to the effects of the Sizewell C Project on recreational receptors five key factors are considered: noise, views, air quality, traffic and people. These are some of the same factors described in the Assessment Criteria section above, which have been used to assess overall amenity and recreation impacts. This approach to the assessment of tranquillity for the Sizewell C Project was presented to and discussed with consultees at and following a meeting on 7 February 2019. Bodies consulted were SCC, SCDC/ESC, Suffolk Coast and Heaths AONB Partnership, Natural England and SLAF.

- 1.3.51 The assessment of tranquillity in relation to the effects of the Sizewell C Project on recreational receptors relies on the professional judgement of the assessor. Surveys of people using recreational resources were undertaken at the main development site and RSPB Minsmere reserve in 2014 and 2015 and included a question on why people visit that location, giving an insight into whether factors relating to tranquillity are important. The full results of these surveys are provided in **Appendices 15A and 15B of Chapter 15 of Volume 2 of the ES** (Doc Ref. 6.3). Questionnaire surveys of people at the associated development sites were not undertaken.
- 1.3.52 Locations where ‘natural’ sounds, views, smells etc predominate are generally more tranquil than locations where ‘man made’ sounds, views, smells etc predominate. This is most often influenced by noise and views, for example:
- Noise: Natural sounds such as bird song, wind, running water and the sea, and also peace and quiet. Man-made sounds such as traffic, machinery, aircraft, human voices.
 - Views: Natural views such as countryside, trees, woodlands, rivers, the sea, and dark skies and stars at night. Man-made views such as urban development, a power station, roads, traffic, electricity pylons, power lines, lights and sky glow caused by lighting at night, and lots of people.
- 1.3.53 The NPPF paragraph 180c) (Ref. 1.6) and the Noise section of the PPG (Ref. 1.11) emphasise the importance of noise on tranquillity.
- 1.3.54 The Noise and Vibration, Air Quality and Landscape and Visual Chapters of **Volumes 2 to 9**, and the Transport chapter of **Volume 2 of the ES** have informed the assessment of effects on tranquillity for each site. In addition, further detail on the assessment of impacts of noise on tranquillity has been undertaken for the main development site (**Volume 2 Chapter 15 of the ES**), the two village bypass (**Volume 5 Chapter 8 of the ES**) and the Sizewell link road (**Volume 6 Chapter 8 of the ES**) following a method designed by Sharps Redmore referred to as the Natural Tranquillity Method, to inform the assessment of effects on tranquillity experienced by amenity and recreation receptors. Details of how the Natural Tranquillity Method is applied is described in **Volume 2 Chapter 15, Volume 5 Chapter 8 and Volume 6 Chapter 8 of the ES**. The Natural Tranquillity Method assessments are included in **Appendix 15E of Volume 2 of the ES** (Doc Ref. 6.3), **Appendix 8A of Volume 5 of the ES** (Doc Ref. 6.6) and **Appendix 8A of Volume 6 of the ES** (Doc Ref. 6.7).
- 1.3.55 The Natural Tranquillity Method was used on these sites for the following reasons.

Main development site

- 1.3.56 The main development site lies within the AONB. The importance of tranquillity within the AONB is recognised in the NPPF paragraph 172 (Ref. 1.6), the Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies (Ref. 1.8), the Suffolk Coast and Heaths Area of Outstanding Natural Beauty Management Plan 2018 -2023 (Ref. 1.15) and the Suffolk Coast and Heaths Area of Outstanding Natural Beauty Natural Beauty and Special Quality Indicators (Ref. 1.16).

Two village bypass and Sizewell link road

- 1.3.57 It was considered that it was not essential to use the Natural Tranquillity Method on-sites outside the AONB, and that effects of changes in tranquillity on amenity and recreation receptors could be assessed referring to the Noise and Vibration, Air Quality and Landscape and Visual Chapters of each site. However, as a precautionary approach it was decided to use the Natural Tranquillity Method for the two village bypass and the Sizewell link road during the operational phase after the completion of construction of the main development site because these projects, with permanent road infrastructure, traffic movement and associated impacts, would lead to permanent changes in tranquillity. It was felt that a greater level of detailed understanding of the potential changes to the noise environment in particular, but also considering changes to views and air quality, and consequent permanent effects on tranquillity would be beneficial.
- 1.3.58 All other associated development sites would be temporary for the construction stage only and would not cause any permanent effects on tranquillity, and have not been assessed using the Natural Tranquillity Method .

f) Assessment methodology

i. Establishing the baseline

Existing baseline

- 1.3.59 The existing baseline was established through a combination of desk studies, site visits and surveys, and consultation with statutory consultees. In addition, surveys of people using PRoW and other linear access routes and areas within the vicinity of the main development site, the proposed rail extension route (i.e. the green rail route), the southern park and ride at Wickham Market were carried out to collect information on the existing usage, and help identify how people may be affected by the Sizewell C Project. As noted in **Table 1.3** SCC was consulted and agreed that the visitor surveys undertaken at these sites were sufficient for the Sizewell C Project, and that surveys at other associated development sites were not necessary. These surveys are

presented in **Appendices 15A, 15B and 15C** of **Chapter 15** of **Volume 2** of the **ES** (Doc Ref. 6.3), and discussed further in the relevant amenity and recreation chapters.

Future baseline

- 1.3.60 The future baseline has been established with reference to any non-Sizewell C developments that may occur during the lifetime of the main development site or associated development sites. Further details to where future baseline conditions have been considered to change are provided within each amenity and recreation chapter in **Volume 2 Chapter 26** of the **ES** (Doc Ref. 6.3).
- 1.3.61 Effects due to climate change may include rising sea level which could potentially affect the Suffolk Coast Path, Sandlings Walk, PRoW E-363/021/0 and the future England Coast Path on the new sea defences. People would be able to walk on higher ground, on the higher sea defence to the west of the coast path should the formal route become unavailable, and a route along the coast within the main development site would therefore be available for the operational phase. Effects due to climate change area assessed in **Volume 2 Chapter 26** of the **ES** (Doc Ref. 6.3).
- 1.3.62 Whilst effects during construction and operation area reported separately, the assessment of effects on amenity and recreation is based on the full construction and operation period and their associated activities rather than specific assessment years.

Assessment of impacts

- 1.3.63 Impacts on recreational amenity due to physical changes to recreational resources (such as PRoW diversions), and changes to noise, views, air quality, traffic and people are assessed following the method described above under the heading 'assessment criteria'.

ii. Inter-relationships

- 1.3.64 The relevant transport, noise and vibration, air quality, landscape and visual and marine navigation assessments have been inherently considered within the assessment of likely amenity and recreation effects arising from the main development site and associated developments.

g) Assumptions and limitations

- 1.3.65 The amenity and recreation chapters adopt the assumptions which underlie the assessment outcomes in the noise and vibration, air quality, landscape and visual and marine navigation chapters of the relevant volumes.

- 1.3.66 Where assumptions and limitations are identified in relation to each amenity and recreation chapter, they are described in the relevant chapter in **Volumes 2 to 9** of the **ES**.

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VOLUME 1, CHAPTER 6, APPENDIX 6L: TERRESTRIAL HISTORIC ENVIRONMENT LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

Annex

Annex 6L.1: Historic Environment Settings Scoping Update

1. Terrestrial Historic Environment Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant terrestrial historic environment effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites, unless otherwise indicated in the topic chapters of the site assessment volumes (**Volumes 2 to 9 of the Environmental Statement (ES)**) (Doc Ref. 6.2 to 6.9). Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project on the terrestrial historic environment as described in the following **ES** chapters:

- **Volume 2, Chapter 16;** and
- **Volumes 3 to 9, Chapter 9.**

1.1.3 Where reference is made to information from other technical assessment chapters to inform the assessment of effects on the terrestrial historic environment, this is referenced in the relevant chapter text.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant terrestrial historic environment effects associated with the proposed development.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the terrestrial historic environment assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

1.2.3 There is no international legislation or policy that is relevant to the terrestrial historic environment assessment of the proposed development.

b) National**i. Legislation**

- 1.2.4 The following legislation is relevant to the assessment of the effects on terrestrial historic environment receptors.
- 1.2.5 The Ancient Monuments and Archaeological Areas Act 1979 sets out that sites assessed to be of national importance may be included within the Schedule of Monuments. These sites are afforded statutory protection and Scheduled Monument Consent is required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a Scheduled Ancient Monument. This Act also provides for the designation of areas of archaeological interest in which statutory provisions for access to construction sites for the purpose of carrying out archaeological works apply.
- 1.2.6 The Secretary of State for the Environment is required to compile under The Planning (Listed Buildings and Conservation Areas) Act 1990 a list of buildings of special architectural or historical interest, which are accorded statutory protection.
- 1.2.7 The Infrastructure (Decisions) Regulations 2010 note duties on the decision-maker in the Development Consent Order (DCO) process to have regard to the desirability of:
- preserving listed buildings, their setting or any features of special architectural or historic interest which they possess;
 - preserving or enhancing the character or appearance of conservation areas; and
 - preserving scheduled monuments and their settings.
- 1.2.8 The Hedgerow Regulations 1997 set out criteria to be used to determine the importance of hedgerows and protect important hedges from removal. Selection criteria include heritage-based considerations. Removal of an important hedgerow is deemed as permitted where a DCO which would require removal of a hedgerow has been granted.
- 1.2.9 The Protection of Military Remains Act 1986 sets out specific protections for aircraft which have crashed or vessels which have sunk or been stranded while in military service. It sets out a general prohibition on any disturbance or removal of such remains without a licence granted by the Secretary of State.

ii. Policy

National Policy Statements

- 1.2.10** The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.1) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.2). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.11** The NPSs set out the Government’s energy policy, the need for new infrastructure and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants’ assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.12** A summary of the relevant NPS EN-1 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**. NPS EN-6 does not set out specific policy that informs the technical assessment of effects. The historic environment is not noted as a nuclear impact at Section 3 of Volume 1 of NPS EN-6, and while the Site Assessment of Sizewell (Volume II, Annex C) notes the potential effects of the scheme on heritage assets, specific policies on the historic environment are set out in NPS EN-1.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement.	How the Requirement has been addressed.
EN-1	Paragraphs 5.8.8 and 5.8.9 requires that “... <i>the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance...</i> ”, referencing the requirements to have consulted the Historic Environment Record (HER), and where appropriate to carry out desk-based assessment (DBA) and further field evaluation. Paragraph 5.8.10 states that “ <i>The applicant should ensure that the extent of the impact of the</i>	The significance of heritage assets potentially affected by the Sizewell C Project have been assessed according to relevant Historic England guidance and is set out within the respective chapters in Volumes 2 to 9 of this ES . Sources of information for the assessments presented in this ES , including a search of the Suffolk HER, are set out at section 1.16. Archaeological DBAs have been carried out for the main development site and associated development sites where it was considered that potential significant adverse effects might arise through direct disturbance and are included within the appendices for the individual chapters.

Ref.	NPS Topic Requirement.	How the Requirement has been addressed.
	<i>proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents."</i>	Further evaluation, in the form of geophysical survey and intrusive evaluation trenching has also been undertaken at a number of locations. Details of and results of surveys undertaken are discussed within the relevant terrestrial historic environment chapters in Volumes 2 to 9 of this ES .
EN-1	Paragraph 5.8.9: <i>"Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact."</i>	Visualisations have been provided, and cross reference has been made to landscape and visual assessment chapters where appropriate. Further details are provided in the relevant terrestrial historic environment chapters in Volumes 2 to 9 of this ES .
EN-1	Paragraphs 5.8.14-15 outline a presumption in favour of the conservation of designated heritage assets, and notes <i>"Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the Infrastructure Planning Commission should refuse consent unless... loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm."</i>	Further details are provided in the relevant terrestrial historic environment chapters in Volumes 2 to 9 of this ES .
EN-1	Paragraph 5.8.16 notes that not all elements of a conservation area necessarily contribute positively to significance and requires that the contribution of elements which may be affected be considered.	Conservation areas are considered within the relevant terrestrial historic environment chapters in Volumes 2 to 9 of this ES .
EN-1	Paragraph 5.8.20 states that the developer should be required to record and advance understanding of the significance of the heritage asset before it is lost.	Outline proposals for archaeological mitigation are set out in an overarching written scheme of investigation (WSI) to be agreed with Suffolk County Council Archaeological Service (SCCAS), with WSIs to be produced for each site where required.

National Planning Policy Framework 2019

- 1.2.13** The National Planning Policy Framework (NPPF) 2019 (Ref. 1.3) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making

framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

- 1.2.14 Section 16 relates to the historic environment and is consistent with the policies of EN-1. A positive strategy should be implemented for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. Heritage assets should be conserved in a manner appropriate to their significance. The terrestrial historic environment baseline has been established and assessed in accordance with NPPF and Planning Practice Guidance (Ref. 1.4).

Government's 25 Year Environment Plan

- 1.2.15 The United Kingdom (UK) Government's 25 Year Environment Plan (Ref. 1.5) sets out the value of the historic environment in general terms but does not set out specific policy.

c) Regional

i. Policy

- 1.2.16 No regional policy over and above that described in **Volume 1, Chapter 3** is deemed relevant to the assessment of the terrestrial historic environment.

d) Local

i. Policy

- 1.2.17 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.18 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan (SCLP) and the Waveney Local Plan (Ref. 1.6). The Sizewell C Project is located within the area covered by the SCLP.

- 1.2.19 The adopted SCLP comprises the 'saved policies' of the SCLP (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

- 1.2.20 In March 2019, SCDC submitted their draft new SCLP (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted Local Plan listed above.

[Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies](#)

- 1.2.21 The following policies have relevance for the proposed development:

- Development Management Policy DM21 – Design: Aesthetics; reiterates the need for proposals to have regard for the existing aesthetic and to establish a strong sense of place, using street scenes and buildings to create attractive and comfortable places to live; and
- Strategic Policy SP15 – Landscape and Townscape; sets out the Council's commitment to enhance and preserve the distinctive historical and architectural value, as well as landscape value and character of the region.

- 1.2.22 Whilst there is no specific policy that governs the development or the strategic proposals for the historic environment, the Development Management Policy (Ref. 1.7) (Historic Environment, paragraph 3.150) sets out the following;

“...decisions on development proposals affecting heritage assets will be informed as appropriate by Conservation Area Appraisals, information from the Historic Environment Record and Archaeological Assessments.”

[Suffolk Coastal District Council Final Draft Local Plan](#)

- 1.2.23 The Suffolk Coastal Final Draft Local Plan (Ref. 1.6) sets out policies for the protection of built heritage assets and archaeological remains at Chapter 11. These policies comprise:

- Policy SCLP11.3: Historic Environment: consideration of the effects of proposed development on the historic environment.
- Policy SCLP11.4: Listed Buildings: sets out criteria for proposals to alter, change or extend the use of a listed building, and development affecting setting.
- Policy SCLP11.5: Conservation Areas: sets out criteria for development within a conservation area.

- Policy SCLP11.6: Non-Designated Heritage Assets: sets out criteria for consideration in proposals for re-use or loss of an asset.
- Policy SCLP11.7: Archaeology: includes the need for proportionate assessment of the potential and significance of remains to be included with an application, appropriate conditions to be imposed on consents.
- Policy SCLP11.8: Parks and Gardens of Historic or Landscape Interest: provides a list of designated parks as well as non-designated historic parklands, and encourages preservation and enhancement of the assets.
- Policy SCLP11.9: Areas to be Protected from Development: defined as spaces that make a positive contribution to the character and setting of a settlement and should be protected, and development which affects these will be severely restricted to ensure they are not compromised. None of these areas are within the proposed development or associated development sites.

1.2.24 The former Suffolk Coastal District has many historically important private and public parks and gardens, some associated with large houses. Particularly significant examples are designated as Registered Parks and Gardens, and are described with non-designated gardens of significance in The Supplementary Planning Guidance 6 Historic Parks and Gardens (Ref. 1.8) which sets out the main qualities and characteristics of parklands, locates and identifies those of particular significance and highlights their importance to facilitate positive management.

e) **Guidance**

1.2.25 This assessment has been undertaken in accordance with the following guidance documents:

- Good Practice Advice in Planning Note 2: Managing Significance in decision-taking in the Historic Environment. Historic England, 2015 (Ref. 1.9).
- Conservation Principles, Policies and Guidance. Historic England (Ref. 1.10).
- Good Practice Advice in Planning Note 3: The Setting of Heritage Assets Historic England, 2017 (Ref. 1.11).
- Research and Archaeology: Framework for the East of England (2000, 2011 and draft updates 2018-19) (Refs. 1.12, 1.13, 1.14, 1.15).

- National and Local Archaeological Standards and Guidance.
 - i. [Good Practice Advice in Planning Note 2: Managing Significance in decision-taking in the Historic Environment. Historic England, 2015](#)
- 1.2.26 Good Practice Advice in Planning Note 2 (Ref. 1.9) provides guidance and information to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy and ensuring compliance with NPPF fundamentals.
- 1.2.27 It is important to understand the nature, extent and level of significance of an asset, and the contribution of its setting to its significance, in order to understand the impact of the proposals on that significance and for decisions to be made in line with legal requirements, objectives of the development plan and the policy requirements of the NPPF.
- 1.2.28 The significance of an asset, as discussed in further detail in section 1.3, is the sum of its archaeological, architectural, historic and artistic interests. Whilst not providing a methodology for producing impact assessments for the historic environment, the guidance draws on Conservation Principles (Ref. 1.10) to set out appropriate steps to follow in order to build a robust understanding of the significance of heritage assets (both designated and undesignated).
- 1.2.29 The guidance emphasises that information required in support of applications for planning permission and listed building consent should be proportionate to the significance of the heritage assets affected and the impact on that significance.
- ii. [Good Practice Advice in Planning Note 3: The Setting of Heritage Assets Historic England, 2017.](#)
- 1.2.30 Good Practice Advice in Planning Note 3 (Ref. 1.11) lays out that the setting of an asset is the surrounding in which a heritage asset is experienced. Elements of setting may make a positive or negative contribution to its significance. This guidance document sets out the parameters by which setting should be explored, documented and presented within assessments.
- 1.2.31 The document sets out five steps to follow to ensure an appropriate level of assessment is achieved. These steps are as follows:
- Step 1: identify which heritage assets and their settings are affected.

- Step 2: the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated.
- Step 3: assess the effects of the proposed development, whether beneficial or harmful, on that significance.
- Step 4: explore the ways to maximise enhancement and avoid or minimise harm.
- Step 5: make and document the decision and monitor outcomes.

iii. [Research and Archaeology: Framework for the East of England](#)

- 1.2.32 East Anglian Archaeology produced a two-part research framework for the East of England (Research and Archaeology: A Framework for the Eastern Counties).
- 1.2.33 Part 1 (Ref. 1.12) comprised an initial resource assessment, which sought to better understand the current state of knowledge and understanding within the region.
- 1.2.34 Part 2 was produced in 2000, comprising a research agenda and strategy (Ref. 1.13), which set out the potential of the evidence currently available within the region, together with gaps in knowledge and research topics. Also presented were a range of research issues which could usefully be addressed within the region. The strategy section of the document considered priorities for future research and outlined an integrated approach to research within the region, exploring collaborative arrangements and partnerships with a prioritised list of objectives.
- 1.2.35 In 2011, the previous research documents were revised and augmented into Research and Archaeology Revisited: A Revised Framework for the East of England (Ref. 1.14). This document considered the new evidence on a period-by-period basis, subdivided within each period into an assessment of key projects undertaken since 2000, an assessment of progress on research topics proposed in 2000 and a consideration of future research topics. These are in the process of being comprehensively reviewed and updated (Ref. 1.15).
- 1.2.36 The first stage of this review process is underway, comprising the revision and updating of the period-based summaries, adding in details of new research and bringing the document up to date in line with current understanding and interpretations and highlighting new research and projects. At the time of submitting the **ES** in early 2020, summaries were available for some time periods with others to follow in due course. Where

available, these summaries were consulted during the production of the **ES** and in formulating the mitigation strategies.

iv. Archaeological Standards and Guidance

1.2.37 Relevant best practice standards and guidance are published by the Chartered Institute for Archaeologists and others as set out below. For the purposes of this assessment, the relevant standards and guidance comprise:

- Chartered Institute for Archaeologists: Standard and guidance for archaeological desk-based assessment 2017 (Ref. 1.16).
- Chartered Institute for Archaeologists: Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment 2014 (Ref. 1.17).
- Chartered Institute for Archaeologists: Standard and guidance for archaeological field evaluation 2014 (Ref. 1.18).
- Chartered Institute for Archaeologists: Standard and guidance for archaeological geophysical survey 2014 (Ref. 1.19).
- SCCAS local standards and guidance relating to fieldwork requirements.
- Standards for Field Archaeology in the East of England (Ref. 1.20).
- European Archaeological Council Guidelines for the use of Geophysics in Archaeology (Ref. 1.21).
- Historic England - Environmental Archaeology (Ref. 1.22).
- Historic England - Geoarchaeology (Ref. 1.23).

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES**.

1.3.2 This section provides a summary of the terrestrial historic environment assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific

additions to the methodology for terrestrial historic environment are described within the relevant chapter of **Volumes 2 to 9** of the **ES**.

1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.

1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

1.3.5 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co.'s responses are detailed in **Table 1.2**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the terrestrial historic environment assessment.

Consultee	Date	Summary of Discussion/Comments
SCCAS, Historic England, ESC	Various	The detailed scope for assessment of effects arising through change to setting was consulted upon over the course of the Sizewell C Project. This document is presented in Annex 6L.1 . Specific comments on the main development site and associated developments are included within the respective ES volumes, where relevant.
SCCAS	Various	The scope and methods for archaeological geophysical survey and evaluation trenching were consulted on with SCCAS in advance of works. Specific comments on the main development site and associated developments are included within the respective ES volumes, where relevant.
SCCAS	Various	Spatial extent of study areas for individual elements of the development were agreed with SCCAS through the Stage 2 and Stage 3 consultation process.

c) Study area

1.3.6 The geographical extent of the study areas for the main development site and associated development sites comprise the individual site, and a

suitable buffer from the site boundary. These are site specific, and consultation was undertaken with Historic England and Suffolk County Council (SCC) with regards the suitability of the spatial scope for each of the sites.

- 1.3.7 The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the terrestrial historic environment chapters of the relevant volumes of the **ES (Volumes 2 to 9)**.

d) **Assessment scenarios**

- 1.3.8 The terrestrial historic environment assessment comprises the assessment of the entire construction and operation phases for the proposed main development site and proposed associated developments (and removal and reinstatement phase where relevant) rather than specific assessment years.

e) **Assessment criteria**

- 1.3.9 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

- 1.3.10 A summary of the assessment criteria used in the terrestrial historic environment assessment is presented in the following sub-sections.

i. **Sensitivity (heritage significance)**

- 1.3.11 NPS EN-1 requires change to the significance of heritage assets to be considered when developing an understanding of the potential effects of a proposed development.

- 1.3.12 The significance of a heritage asset is the value which it holds to current and future generations as a result of its historic, archaeological, architectural or artistic interests. These provide the basis for considering the significance of each heritage asset (including the contribution of its setting to those interests). These interests are set out in NPS EN-1 (para. 5.8.2) and are discussed in more detail in the Conservation Principles (Ref. 1.15) and the Good Practice Advice Planning Note 2 (Ref. 1.14). These comprise:

- Archaeological – the ability of a heritage asset to hold information about the past which can be retrieved through specialist investigation.

- Historical – which can be through association with past events or people, or where a heritage asset is illustrative of a particular asset type, theme or period.
- Architectural/Artistic – values which derive from a contemporary appreciation of a heritage asset's aesthetics.

1.3.13 NPS EN-1 notes that setting contributes to an asset's significance and sets out policies regarding change to the setting of heritage assets, but does not offer an explicit definition. Setting is defined in both the NPPF and by Historic England in Good Practice Advice Planning Note 3 (Ref. 1.16) as:

“...the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.”

1.3.14 Good Practice Advice Planning Note 3 (Ref. 1.16) advises that the following aspects of setting should be considered in addition to any identified key attributes:

- the physical surroundings of the asset, including its relationship with other assets;
- the way the asset is appreciated; and
- the asset's associations and patterns of use.

1.3.15 For the purposes of assessing the significance of effects within this **ES**, heritage significance has been assigned to one of four classes, with reference to the heritage interests described above and relying on professional judgement as informed by policy and guidance. The hierarchy given in **Table 1.3** reflects the EN-1 distinction between designated and non-designated heritage assets. It also distinguishes between designated assets of the highest heritage significance (i.e. scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites) and other designated heritage assets.

1.3.16 The assignment of assets into one of the four classes of heritage significance is supported by a clear narrative and professional judgement. There may be assets which are currently non-designated but may, as set out in the NPPF, be considered of 'schedulable quality', i.e. to hold equivalent significance to scheduled monuments. Locally significant sites

may be considered of higher than 'low' significance, for example when they cover substantial areas.

- 1.3.17 The criteria used in the terrestrial historic environment assessment for determining the sensitivity of receptors are set out in **Table 1.3**.

Table 1.3: Assessment of the heritage significance of receptors for terrestrial historic environment.

Heritage Significance.	Description	Example Asset Class.
High	Asset has significance for an outstanding level of archaeological, architectural, historic and/or artistic interest.	All designated heritage assets or non-designated assets of demonstrably schedulable quality.
Medium	Asset has significance for a high level of archaeological, architectural, historic and/or artistic interest.	Locally listed buildings and buildings of merit.
Low	Asset has significance for elements of archaeological architectural, historic or artistic interest.	Locally-significant archaeological site.
Very Low	Due to its nature of form / condition / survival, cannot be considered as an asset in its own right.	Non-extant Historic Environment Record (HER) record.

ii. Magnitude

- 1.3.18 The magnitude of impact is based on the consequences that the proposed development would have on the significance of the historic environment resource and has been considered in terms of high-medium-low-very low. The magnitude of an impact is based on a number of factors:

- the duration of the impact (temporary, permanent or reversible);
- physical changes caused by the impact (both positive and negative);
- the extent of the heritage asset that would be affected (e.g. the whole or a very small part);
- the nature of the heritage asset that would be affected; and
- the overall impact of changes on the values and significance of the heritage asset (including its setting).

- 1.3.19 In this context, the magnitude of impact arising through change in the setting of a heritage asset may depend on individual aspects of that setting,

and assessments must be, by their nature, specific to the individual assets being considered.

- 1.3.20** Impacts on receptors are assigned to one of four classes of magnitude. The criteria for the assessment of magnitude are shown in **Table 1.4**. Impacts can be adverse or beneficial and it is recognised that EN-1 (para. 5.8.13) looks to developers to make, where possible, a positive contribution to the historic environment as part of its design response.
- 1.3.21** NPS EN-1 further distinguishes between ‘harm’ and ‘substantial harm’, and sets out how development that gives rise to harm should be considered within the planning process. For the purposes of this assessment, any adverse change to a designated heritage asset would normally be considered to comprise harm, while a high magnitude of change would approach or constitute substantial harm. Comments on the magnitude of any harm accruing to designated heritage assets or non-designated heritage assets of equivalent heritage significance are made in the narrative of the assessment.

Table 1.4: Assessment of magnitude of impact on the terrestrial historic environment.

Magnitude	Summary Rationale (negative).	Summary Rationale (positive).
High	Loss of significance of an order of magnitude that would result from irreversible total or substantial demolition/disturbance of a heritage asset or from the disassociation of an asset from its setting. This would generally be considered substantial harm.	Sympathetic restoration of an at-risk or otherwise degraded heritage asset and/or its setting and bringing into sustainable use with robust long-term management secured.
Medium	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its importance. Change to the key characteristics of an asset’s setting, which gives rise to lasting harm to the significance of the asset but which still allows its archaeological, architectural or historic interest to be appreciated. Impacts of this magnitude would generally be considered less than substantial harm on the heritage significance of an asset.	Appropriate stabilisation and/or enhancement of a heritage asset and/or its setting that better reveal the significance of the asset or contribute to a long-term sustainable use or management regime.

Low	Minor loss to or alteration of an asset which leaves its current significance largely intact. Minor and/or short term changes to setting which do not affect the key characteristics and in which the historical context remains substantially intact. Impacts of this magnitude would generally be considered less than substantial harm on the heritage significance of an asset.	Minor enhancements to a heritage asset and/or its setting that better reveal its significance or contribute to sustainable use and management.
Very Low	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and/or short term or reversible change to setting which does not affect the significance of the asset. Impacts of this magnitude would generally be considered of limited harm to heritage significance.	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and/or short term or reversible change to setting which does not affect the significance of the asset.

iii. Effect definitions

- 1.3.22 The classification of the effect is judged on the relationship of the magnitude of impact to the assessed heritage significance of the resource.
- 1.3.23 The assessment of the effect is reported following incorporation of environmental measures into the design, such as embedded mitigation.
- 1.3.24 The definitions of effect for the terrestrial historic environment assessment are shown in **Table 1.5**.

Table 1.5: Classification of effects

		Heritage Significance of Receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

- 1.3.25 Following the classification of an effect, as presented in **Table 1.5**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

- 1.3.26 All assessments are presented as clear narrative discussions setting out the significance of the relevant heritage asset(s) and, where appropriate, contribution of their settings to significance, providing a description of the anticipated change and setting out the impact and the classification of the effect in line with the definitions set out in **Tables 1.3, 1.4 and 1.5** above.

f) **Assessment methodology**

i. **Potential historic environment receptors**

- 1.3.27 The historic environment is defined in NPS EN-1, as: "*All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.*" (Ref. 1.1).
- 1.3.28 Therefore, terrestrial historic environment receptors comprise heritage assets (designated and non-designated) and historic landscapes. NPS EN-1 sets out that a heritage asset is an element of the historic environment which has sufficient archaeological, historic or artistic/architectural interest to be considered within the planning process.
- 1.3.29 Direct effects on heritage assets are those which result from physical damage or disturbance which give rise to a loss of heritage significance. Consequently, it is only those assets which might be physically disturbed by (i.e. within the footprint of) the proposed development and associated enabling works such as site compounds and access routes, which are potentially subject to direct effects.
- 1.3.30 Indirect effects have been defined as those which result in change to heritage significance but do not give rise to physical damage or disturbance to the asset. In this context, these effects would generally arise through change to the settings of heritage assets.
- 1.3.31 Assessment of settings is primarily associated with designated heritage assets or non-designated heritage assets of equivalent significance (where such assets are identified).
- 1.3.32 Historic landscape character is also considered as a heritage asset, and is assessed in terms of change to the heritage significance of the landscape as distinct from the assessment of change to landscape character.

ii. Establishing the baseline

Existing baseline

1.3.33 Heritage assets were identified through a number of sources. Further details are set out within the relevant chapter of **Volumes 2 to 9** of the **ES**:

- a search of the records held at the National Monuments Record and the SCC HER;
- a search of the National Heritage List for England, which contains designated data for the whole of the UK;
- analysis of the Historic Landscape Characterisation data for Suffolk;
- a review of available Suffolk National Mapping Programme data sets;
- a review of the available Light Detecting and Ranging data from Environment Agency Geomatics;
- a search of historical maps and documentation at the Ipswich branch of the Suffolk Record Office;
- aerial photography;
- a search of the Cambridge University Collection of Aerial Photography; and
- consultation with SCCAS and English Heritage/ Historic England (see specific site chapters for further details of consultation undertaken).

1.3.34 A programme of non-intrusive (e.g. geophysical surveys and site visits) and intrusive site investigations (evaluation trenching) were carried out, where practicable, at locations across the main development site and associated development sites in order to identify both known and previously unrecorded heritage assets (e.g. historic landscape features, extant earthworks). The extent of archaeological survey undertaken and any implications for understanding the baseline are set out in the relevant chapters of **Volumes 2 to 9** of the **ES**. Where undertaken, evaluation trenching was designed in consultation with SCCAS and carried out in accordance with an agreed WSI for archaeological investigation.

1.3.35 On the basis of the results of the non-intrusive and intrusive investigations, a programme of mitigation has been designed in consultation with SCCAS. Details are included within the relevant chapter of **Volumes 2 to 9** of the **ES**.

1.3.36 In accordance with Step 1 of the Historic England guidance on setting (Ref. 1.16), a desk-based appraisal supported by site visits was undertaken to identify those assets with settings which might be sensitive to change arising from the proposed development. The heritage assets identified within the data search comprised a number of different asset types with differing characteristics.

1.3.37 The settings scoping appraisal included in **Volume 1, Appendix 6L, Annex 6L.1** of the **ES** has regard to the specific nature of each asset's setting, and considers factors such as visibility of the proposed development in views of and from heritage assets as well as other potential perceptual changes such as increased traffic movements and noise. The process of appraisal has been an iterative process which commenced with an initial options appraisal. It has been refined through engagement with consultees before being presented in the settings scoping study. The appraisal was updated in Spring 2019 to reflect changes to the Sizewell C Project.

Future baseline

1.3.38 There are no committed developments or predicted changes that would materially alter the baseline conditions during the construction, operation and removal and reinstatement phases of the proposed development. It is likely however, that where present, continuing intensive arable cultivation of the sites would result in the progressive disturbance of any archaeological remains which may be present. Further detail on the future baseline is provided in the relevant chapters of **Volumes 2 to 9** of the **ES**.

iii. Assessment Phases

1.3.39 The assessment of effects on terrestrial historic environment during construction, operation and removal and reinstatement phases uses the same significance assessment methodology and are presented separately in the assessment chapters. These assessments differ primarily in the nature of the effects predicted, and consequently follow the same basic process:

- identify receptors which may be subject to a likely potential significant adverse effect;
- assess the significance of any heritage assets likely to be affected;
- identify the nature of the potential impact, whether direct or indirect and its magnitude; and
- identify the need for and form of any additional mitigation.

iv. Inter-relationships

- 1.3.40 Archaeological remains on the sites are not subject to changes other than direct disturbance as a result of construction activity, and therefore no inter-relationship effects are anticipated.
- 1.3.41 Built heritage assets may be subject to indirect effects as a result of factors such as visibility of the proposed main development site or proposed associated development sites in views of and from heritage assets as well as other potential perceptual change such as increased traffic movements and noise, which may affect heritage significance. Any visual effects would arise as a result of effects on valued views which represent a subset of the changes considered within the assessments of effects arising as a result of change to setting and historic landscape character. Similarly changes in noise environment are considered, insofar as these are appropriate, in the assessments of effects arising as a result of change to setting. There would consequently be no further inter-relationship effects.

g) Assumptions and limitations

- 1.3.42 The following overall limitations have been identified:
- DBA is a predictive tool and relies on a series of assumptions and extrapolations to develop an understanding of the potential extent and character of archaeological remains within the site;
 - a programme of geophysical survey and evaluation trenching has been undertaken at locations across the proposed development sites and is detailed within relevant chapters of **Volumes 2 to 9** of the **ES**. Full coverage across all development areas was not possible in some instances due to access. Details are set out within the individual site chapters;
 - geophysical survey is based on taking physical measurements that may have a number of causes. Conclusions from this type of survey remain predictive, but allow for more refined inferences to be drawn on the basis of the nature and morphology of discrete anomalies;
 - evaluation trenching allows inferences made on the basis of desk-based and geophysical survey to be tested. While this approach considers a sample area of a site, it allows a clear understanding of the location, nature and significance of heritage assets which can be considered robust; and

- where assessment conclusions are based on desk-based or geophysical survey, the implications for the robustness of conclusions based on a reasonable worst-case is provided.

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VOLUME 1, CHAPTER 6, APPENDIX 6L, ANNEX6 L1: HISTORIC
ENVIRONMENT SETTINGS SCOPING UPDATE

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None provided.

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1. Historic Environment Settings Scoping Update

1.1 Introduction

1.1.1 This technical note is intended to supplement the Settings Assessment Scope produced in 2015, provided at **Appendix B** of this annex. It sets out proposals for the scope of assessment of potential effects arising from change to setting of heritage assets caused by the construction and operation of the proposed Sizewell C Nuclear Power Station and associated developments.

1.1.2 The current document updates the original Settings Assessment Scope through consideration of:

- Revision to site boundaries in a number of cases for the associated development sites and new sites which have been included within the Stage 3 consultation. New and substantially revised sites include:
 - two village bypass;
 - Yoxford roundabout and other highway improvements;
 - Theberton bypass and Sizewell link road;
 - freight management sites;
 - additional highways improvements; and
 - rail improvements.
- Consultation responses during Stage 2 and Stage 3 following comments from:
 - East Suffolk Council (formerly Suffolk Coastal District Council (SCDC) and Waveney District Council (WDC));
 - Historic England; and
 - Suffolk County Council Archaeological Service.
- Data searches of the Historic England database for the new sites and updated searches for sites previously covered in the settings scoping were undertaken in April 2018.
- Recent updates to the Historic England Settings Guidance: Historic Environment Good Practice Advice in Planning Note 3.

1.2 Revised scope of assessment

a) Consultation in 2016

1.2.1 A settings consultation meeting was undertaken in February 2016, attended by Amec Foster Wheeler (now Wood) archaeologists, Historic England and conservation officers from WDC and SCDC. The following points were raised for consideration:

- The buildings included within the curtilage of the listed buildings at Upper Abbey Farm, with the associated non-designated structures to be considered within the assessment of the designated assets.
- WDC suggested that effects on Reydon Hall and Reydon Church should be considered. Assets at this location were reviewed in light of this comment, but it was determined that as a result of the distance of these assets from the proposed development and the presence of intervening planting that no assets within Reydon would be affected by the proposed development.

1.2.2 Potential effects on these heritage assets were considered. The comments of the SCDC Conservation officer regarding curtilage has been noted and will be considered appropriately within the Environmental Impact Assessment.

b) Review of 2015 settings scoping assets

1.2.3 A review of the development proposals was carried out and identified a small number of heritage assets that may be subject to adverse effects but which were not scoped in to the 2015 Settings Scoping document as a result of design change or the addition of elements to the proposed development. Rationale for the inclusion of these heritage assets within the scope are set out in the tables within **section 3** of this document.

1.2.4 In addition, there are a number of locations where assets were scoped in to the 2015 Settings Scoping document due to their proximity to roads or other works, primarily the B1122 and the A12, and the increase in traffic associated with the main development site construction. Following the refinement of proposals at Stage 3, the scoped in assets are discussed within the relevant site assessment. It is noted in the table at **Appendix A** of this annex where assets may be subject to cumulative effects.

1.2.5 The refinement of setting scope includes:

- Following the refinement of proposals for the two village bypass, including the selection of a final route and the removal of works at Farnham bend from the proposals, the scope of assessment here has been amended. Detailed rationales are set out in **Table 1.1**.
- The more detailed study of the area around Yoxford undertaken as part of the desk based assessment (DBA) of the proposed roundabout has allowed the general conclusion of the 2015 Settings Scoping document to be refined. This has resulted in a number of heritage assets at Yoxford and Cockfield Park being excluded from the scope of assessment. Detailed rationales are set out in **Table 1.2**.
- A small number of assets were originally included due to their proximity to the B1122 and a general increase in traffic as part of the main site proposals. These were focused along the B1122 between the A12 south of Yoxford and Theberton – and were primarily heritage assets at Theberton, Anneson's Corner and Middleton Moor. These will be considered within the assessment of effects of the Sizewell link road and the Theberton bypass now that further details of the potential options or road improvements in this area are available. Detailed rationales are set out in **Table 1.3**.
- The conservation area and listed buildings at Leiston were originally included within the scope of assessment. A review of the proposals close to here, and the selection of the green rail route means that while the proposed development may be visible in a small number of views from a small number of the assets within the group, it would not be with sufficient prominence to give rise to discernible adverse effects. Only Wood Farmhouse (LB 1227752) will now be included due to its proximity to the proposed green rail route.
- In response to landscape proposals at the Wickham Market park and ride site set out within the Stage 3 consultation (which include 3 metres (m) grass covered bunds to support screening), the joint response of SCDC and Suffolk County Council requested that the conservation areas at Marlesford and Wickham, and associated listed buildings within the vicinity of the proposed development, which had previously been scoped out, should be included within the assessment. The list of scoped in assets has been revised accordingly, and includes the buildings within the two conservation areas, as well as individual assets in and around the site, with the exception of the buildings towards the central part of Wickham Market conservation area, away from the proposed development and focused around the main street and square, which remain scoped out.

- In response to landscape proposals at the Darsham park and ride site set out within the Stage 3 consultation (which include 3m grass covered bunds to support screening) SCDC requested that settings issues within 1 kilometre (km) of the site be re-considered, specifically to include Darsham Old Hall (LB 1198815) and Oak Hall (LB1030664).

c) **Scope of assessment**

1.2.6 Taking the considerations identified above into account, a proposed revised scope of assessment of effects on the significance of heritage assets arising through change to setting is set out below. Where a number of assets can be functionally or geographically linked, these have been considered as groups for the purposes of this exercise; this is intended to reflect a desire to acknowledge common aspects in the settings of these assets and to avoid unnecessary repetition of descriptive data. Effects on the setting of assets within the group will be considered individually within the main assessment. Assets may be included in the assessment of effects of more than one element of the proposed development, and cumulative settings effects will also be considered.

1.2.7 **Appendix A** of this annex contains a table setting out scoped-in assets, which proposed development they relate to, and establishes where there are cumulative settings effects. These are grouped and summarised in the list below:

- Grade II listed buildings and associated non-designated structures at Upper Abbey Farm;
- Cottage 450m west of Upper Abbey Farmhouse (Abbey Cottage – LB 1216395);
- Potter's Farmhouse (LB 1228267);
- Leiston Abbey (first site) with later chapel and pillbox (SM 1015687);
- The Watch House, Sizewell (LB II 1391360);
- Scheduled monument, Grade I and Grade II listed buildings at Leiston Abbey;
- Grade II and II* listed buildings and non-designated designed landscape at Theberton House; including Gate and gate piers at junction of Leiston Road and Onner's Lane (LB 1287303);

- Grade II listed buildings at Potter's Street crossroads;
- Hill Farmhouse (LB1287643);
- Fisher's Farmhouse (LB II 1216275);
- Wood Farmhouse (LB II 1227752);
- Grade I and II listed buildings at Theberton, including Grade II listed buildings at Rattla Corner, Moat Farmhouse (LB 1228246) and Grade II listed buildings at Theberton Hall;
- Conservation area and listed buildings at Thorpeness;
- Dovehouse Farmhouse (LB 1199213);
- Grade II listed buildings at Anneson's Corner including Valley Farmhouse (LB1198389) and Building to Rear of Valley Farmhouse (LB 1030832);
- Hill Farmhouse (LB 1030643);
- Pine Tree Cottage (LB 1199326);
- Grade II and II* listed buildings at Middleton Moor;
- Non-designated coastguard cottages, Dunwich Heath;
- Grade II listed buildings at Fordley Hall (1199224) and Vale Farmhouse (LB 1377244);
- Beveriche Manor Farmhouse (LB 1030593);
- Conservation area, scheduled monument and Grade I, II and II* listed buildings at Aldeburgh;
- Slaughden Martello Tower (LB II* 1269724/ SM 1006041);
- Rookery Farmhouse (LB 1377236);

- Conservation area and Grade II and II* listed buildings at Yoxford including Rookery Cottages (LB 1200791) and The Gables (LB1030627);
- Non-designated Cockfield Park (YOX 006) and Cockfield Hall Lodge (LB 1200647);
- Rookery Park (YOX 013);
- Conservation area and Grade I, II and II* listed buildings and non-designated assets at Southwold;
- Orford Castle (SM 1014860);
- Grade II listed lighthouse, scheduled and listed military structures at Orford Ness;
- Grade II and II* listed buildings at Stratford St Andrew and Farnham (including Church of St Mary and Farnham Manor);
- Glemham Park and Garden (1001461) and listed buildings at Glemham Hall;
- Bowl barrows and ring ditches (SMs 1011339–44) south east of Ipswich along the A14;
- Glevering Bridge (LB1030833);
- Ponds Barn (HER FNM 022);
- Conservation area and listed buildings at Wickham Market;
- Conservation area and listed buildings at Marlesford and along Marlesford main road;
- The Rookery (LB 1030559);
- Listed buildings at Hacheston and Lower Hacheston;
- Oak Hall (LB 1030664);

- Darsham Old Hall (LB 1198815);
- Stone Cottage (LB 1030680); and
- Saxmundham Conservation Area and associated listed buildings.

1.3 Additional Sites Appraisal

a) Two village bypass

- 1.3.1 Following Stage 2 consultation, and revision to the proposed bypass location, the proposed route now runs south of Stratford St Andrew and Farnham. Consequently, the following assets were appraised for potential effects.

Table 1.1: Two village bypass - summary of heritage assets to be included within scope of assessment

National Heritage List for England (NHLE) Reference	Name	Rationale	To be assessed further in ES
1030901	Benhall Lodge Stables	No change anticipated during construction or operation of the new road as a result of screening and distance from works.	N
1230208	Ducks Paddle Cottage	No change anticipated during construction or operation of the new road as a result of screening and distance from works.	N
1230210	Farnham Manor	Proximity to proposed development could result in visual and audible change to setting during construction and operation of the proposed road. The relationship between Farnham Manor and Foxburrow Wood could be affected by the introduction of the proposed road.	Y
1230211	Church of St Mary	New road would be present across the landscape to the south of the church which forms part of its rural setting. Proximity to proposed development could result in visual and audible change to setting during construction and operation of the proposed road.	Y
1230212	Rose Hill House	No change anticipated during construction or operation of the new road as a result of screening and distance from works.	N
1230213	Elm Tree Farmhouse	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y
1230214	Elm Tree Cottage	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y

National Heritage List for England (NHLE) Reference	Name	Rationale	To be assessed further in ES
1230215	Post Office Stores	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y
1230216	George and Dragon	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y
1230217	Turret Cottage	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y
1231406	Stratford Hall	Visibility of, and noise from, new road very limited. No effect anticipated during construction, possible very minor positive change following completion of new road.	N
1231407	Church of St Andrew	No change anticipated during construction with reduction in noise from traffic following completion of new road.	Y
1278123	Four cottages 30m south of St Andrew's Church	No change anticipated during construction with substantial reduction in visibility of and noise from traffic following completion of new road.	Y
1278707	Hill Farmhouse	Very limited visual and audible change to setting anticipated during construction and operation of the proposed road.	N
1377115	Benhallstock Cottages	Asset is adjacent to proposed works compound. Potential noise and visual intrusion during construction, but reduced traffic noise and restored connection to Benhall Grove parkland following completion of new road.	Y

National Heritage List for England (NHLE) Reference	Name	Rationale	To be assessed further in ES
1001461	Glemham Hall (Park and Garden)	Grade II historic parkland is adjacent to western proposed works compound, and close to proposed roundabout. Although clearly separated by shelter/screening planting to boundary of parkland. The proximity to the development means there may be some limited adverse effect. Change following completion of proposed road would be minimal	Y
1230629 1230800 1278406 1278438 1278507	Listed buildings at Glemham Hall: <ul style="list-style-type: none"> Retaining wall of ha-ha 30 metres west of Little Glemham Hall Garden walling to south of Little Glemham Hall Lodge at entrance to Little Glemham Hall Little Glemham Hall Stables Little Glemham Hall 	Grade II historic parkland, which these assets form a part of, is adjacent to western proposed works compound, and close to proposed roundabout. Although clearly separated by shelter/screening planting to boundary of parkland. The proximity to the development means there may be some limited adverse effect. Change following completion of proposed road would be minimal	Y (consultee request)
Non designated Historic Environment Record (HER) ref: FNM 022	Ponds Barn	Close proximity to proposed road alignment means there may increase of adverse effect in terms of noise although visibility of the proposed development would be limited by screening and intervening buildings. Included at consultee request.	Y

b) Yoxford roundabout

- 1.3.2 A roundabout is proposed between the B1122 and the A12 at the eastern edge of Yoxford village. A DBA was undertaken in 2018. The following assets were appraised for potential effects due to their location towards the edge of the village.

Table 1.2: Yoxford roundabout - summary of heritage assets to be included within scope of assessment

NHLE Reference	Name	Rationale	To be assessed further in ES
--	Yoxford Conservation Area including contributing non-designated buildings.	Site-boundary encompasses part of the conservation area. Potential effect, due to proximity to development, as a result of visual and audible change to setting anticipated during construction and operation of the proposed junction.	Y
YOX 013	Rookery Park	Non-designated parkland, currently considered for inclusion within the revised Yoxford conservation area boundary. Potential effect, due to proximity to development, as a result of visual and audible change to setting anticipated during construction and operation of the proposed junction. Consultee request for inclusion.	Y
YOX 006	Cockfield Park	Non-designated parkland, currently considered for inclusion within the revised Yoxford conservation area boundary. Potential effect, due to proximity to development, as a result of visual and audible change to setting anticipated during construction and operation of the proposed junction. Consultee request for inclusion.	Y
Listed buildings at eastern side of Yoxford village			
1030627	The Gables	Potential effect due to proximity to development, as a result of visual and audible change to setting anticipated during construction and operation of the proposed junction, as well as increased traffic along the A12.	Y
1030625	The Limes	No change anticipated during construction or operation of the new junction as a result of village location, screening and distance from works.	N
1200636	Satis House	Located at eastern edge of village, in close proximity to site. Potential visual and audible change to setting anticipated during construction and operation of the proposed junction.	Y
1200791	Rookery Cottages	Proposed junction would lie closer to asset resulting in potentially increased visual and audible change to setting.	Y
1030626	Old School Cottages	Potential effect, as a result of visual and audible change to setting anticipated due to increased traffic along the A12.	Y

NOT PROTECTIVELY MARKED

NHLE Reference	Name	Rationale	To be assessed further in ES
1377237	White Lodge and the White House	Located at eastern edge of village, in close proximity to site. Potential visual and audible change to setting anticipated during construction and operation of the proposed junction.	Y
Listed buildings at Cockfield Hall			
1030621	Cockfield Hall	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1030622	Dovecote Cockfield Hall	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1030623	Gateway 20m west north west of Cockfield Hall Gatehouse (including adjoining walling)	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1200577	Coach House and Barn Cockfield Hall	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1200596	Walling to north and west of Cockfield Hall Gatehouse	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1200607	Gateway immediately north west of Coach House and Barn, Cockfield Hall (including adjoining walling)	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1200647	Cockfield Hall Lodge	Potential effect, as a result of visual and audible change to setting anticipated due to increased traffic along the A12.	Y
1300688	The Gatehouse Cockfield Hall	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N

NHLE Reference	Name	Rationale	To be assessed further in ES
1377235	Gateway immediately south east of Coach House and Barn, Cockfield Hall (including adjoining L shaped section of walling to south east)	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N
1377274	Dairy Range Cockfield Hall	No change anticipated during construction or operation of the new junction as a result of location, screening and distance from works.	N

c) Sizewell link road

1.3.3 The following assets were appraised for potential effects.

Table 1.3: Theberton bypass and Sizewell link road summary of heritage assets to be included within scope of assessment (west to east).

NHLE Reference	Name	Rationale	To be assessed further in ES
Listed buildings at Kelsale Lodge			
1198833	Kelsale Lodge	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting and existing A12 is perceptible as a distant feature; no change is anticipated.	N
1377217	Barn 50m south east of Kelsale Lodge	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting and existing A12 is perceptible as a distant feature; no change is anticipated.	N
1377243	Laurel Farmhouse	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting the existing A12 passes adjacent to the house; no change is anticipated.	N
Individual Assets			
1377236	Rookery Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
1183433	Bark Barn	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting and existing A12 is perceptible; no change is anticipated.	N
1030593	Beveriche Manor Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction	Y

NHLE Reference	Name	Rationale	To be assessed further in ES
		in traffic noise may present a positive effect.	
Grade II listed buildings at Fordley Hall			
1199224	Fordley Hall	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
1377244	Vale Farmhouse	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
Grade II and II* listed buildings at Middleton Moor			
1030645	Thatched House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
1199307	Moor Farmhouse	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
1283443	The Cottage (occupied by Mr Mclean)	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
Individual Assets			
1199326	Pine Tree Cottage	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
1030643	Hill Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise may present a minor positive effect.	Y

NHLE Reference	Name	Rationale	To be assessed further in ES
1030642	Packway Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated.	N
1199213	Dovehouse Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
Grade II listed buildings at Annesons Corner			
1283470	Valley Farmhouse Annesons Corner	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
1377245	Farm buildings 30m east of Valley Farmhouse, Annesons Corner	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; reduction in traffic noise may present a minor positive effect.	Y
Individual Assets			
1030644	Fenn Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated.	N
1283440	Manor House	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated,	N
Grade II listed buildings at Theberton Hall			
1227753	Gates, gateway, walling and wall head 30m west of Theberton Hall	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y

NHLE Reference	Name	Rationale	To be assessed further in ES
1287529	Theberton Hall	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
Listed buildings within Theberton Village			
1227756	Church of St Peter	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1227758	The Old Rectory	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1227759	Stable block 10m to south of The Lion Public House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1228180	Thatched House, The Cottage	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1228270	Barn 30m south east of Old Manor House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1228384	Old Manor House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1287282	Flint House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y

NHLE Reference	Name	Rationale	To be assessed further in ES
1287533	The Lion Public House	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1227755	1-4, Church Road	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1227920	Lilycot	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; Reduction in traffic noise and vehicle movements within the village may present a positive effect.	Y
1228246	Moat Farmhouse	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise from new road may be perceptible.	Y
Grade II listed buildings at Potter's Street cross roads			
1228262	The Cottage	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated from the construction or operation of the new road. Effects arising from construction of the main development site and construction campus will be considered separately.	N
1228263	Flash Cottages	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated from the construction or operation of the new road. Effects arising from construction of the main development site and construction campus will be considered separately.	N
1228265	Woodview	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated from the construction or operation of the new road.	N

NHLE Reference	Name	Rationale	To be assessed further in ES
		Effects arising from construction of the main development site and construction campus will be considered separately.	
Grade II and II* listed buildings and non-designated parkland at Theberton House			
1228266	Bob's Cottage	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
1287237	Gate and gate piers 105m south east of main entrance to Theberton House	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
1287260	Gate and gate piers 80 metres north west of main entrance to Theberton House	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
1228268	Theberton House Stables	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
1228269	Gateway 45m north of main entrance to Theberton House	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible.	Y

NHLE Reference	Name	Rationale	To be assessed further in ES
		Effects arising from construction of the main development site and construction campus will be considered separately.	
1228378	Theberton House	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
1287235	Walls enclosing garden 60m to north of Theberton House and greenhouse at north end	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is limited by intervening topography and planting but noise and traffic movements from new road may be perceptible. Effects arising from construction of the main development site and construction campus will be considered separately.	Y
Individual assets			
1287643	Hill Farmhouse	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated from the construction or operation of the new road. Effects arising from construction of the main development site, construction campus and green rail route will be considered separately.	N
1287303	Gate and gate piers at junction of Leiston Road and Onner's Lane	Asset is within site boundary. While no direct effect is anticipated, measures to protect the asset from inadvertent harm during construction and operation of the new road will be considered. Change to setting may arise from increased traffic movements, although asset's setting is defined by relationship to existing road.	Y
1228267	Potter's Farmhouse	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; no change is anticipated from the construction or operation of the new road.	N

NHLE Reference	Name	Rationale	To be assessed further in ES
		Effects arising from construction of the main development site and construction campus will be considered separately.	

d) Freight management sites

- 1.3.4 A DBA was undertaken for the two potential freight management sites consulted on at Stage 3 (option 1 – Seven Hills and option 2 – Innocence Farm). The following designated heritage assets were identified within the study area.

Table 1.4: Freight management sites - summary of heritage assets to be included within scope of assessment

NHLE Reference	Name	Rationale	To be assessed further in ES
1011339–44	Bowl barrows and ring ditches	Should option 1 be selected, then the degradation of the broader landscape setting through the removal of archaeological remains forming part of a wider Bronze Age funerary landscape.	Y
1030627	Decoy Cottage	No effects on setting are anticipated through the proposals as relating to option 1 site. The asset is screened from the Ipswich-Felixstowe Road by surrounding woodland and visual impacts associated with a freight management facility on the experience of the asset are expected to be negligible. Noise-related impacts resulting from the same proposal are expected to be negligible in relation to present use of the main road and the distance thereof.	N

e) Other Highways improvement

- 1.3.5 The nature of the other highways improvements means that change to setting of designated heritage assets during construction would be very limited as a result of the limited scope and duration of the works. The exceptions to this are set out within the table below:

Table 1.5: Road improvements - summary of heritage assets to be included within scope of assessment

NHLE Reference	Name	Rationale	To be assessed further in ES
1030680	Stone Cottage	Proximity to proposed development	Y

f) Rail improvements

- 1.3.6 A review of designated heritage data held by Historic England and conservation area designations held by SCDC within the 500m of the proposed works was undertaken. No assets were found to be immediately adjacent to the locations, or have the potential to be affected by the proposed level crossing upgrades.
- 1.3.7 All of the proposed level crossing upgrade works have therefore been screened out of the historic environment assessment, as they are not likely to give rise to significant effects on the historic environment.

Appendix A: UK EPR Sizewell C – Historic Environment – 2019 Settings Assessment Scoping Summary

Table A.1: Summary of scoped-in assets

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
Grade II listed buildings at Upper Abbey Farm											
LB 1216394	II Upper Abbey Farmhouse	Yes	--	--	--	--	--	--	--	--	--
LB 1216655	II Barn 40m north Of Upper Abbey Farmhouse	Yes	--	--	--	--	--	--	--	--	--
Individual assets											
LB 1216395	II Cottage 450m west of Upper Abbey Farmhouse (Abbey Cottage)	Yes	--	--	--	--	--	--	--	--	--
LB 1228267	II Potter's Farmhouse	Yes	--	--	--	--	--	--	--	--	--
SM 1015687	Leiston Abbey (first site) with later chapel and pillbox	Yes	--	--	--	--	--	--	--	--	--
LB 1391360	II The Watch-House, Sizewell	Yes	--	--	--	--	--	--	--	--	--
Scheduled monument and Grade I and II listed buildings at Leiston Abbey											
SM 1014520	Leiston Abbey (second site) and moated site	Yes	Yes	--	--	--	--	--	--	--	Yes
LB 1215753	I St Mary's Abbey	Yes	Yes	--	--	--	--	--	--	--	Yes

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1215754 II	Retreat House	Yes	Yes	--	--	--	--	--	--	--	Yes
LB 1216380 II	Barn at Abbey Farm	Yes	Yes	--	--	--	--	--	--	--	Yes
LB 1268290 II	The Guesten Hall at Abbey Farm	Yes	Yes	--	--	--	--	--	--	--	Yes
Grade II and II* listed buildings and non-designated parkland at Theberton House											
LB 1228266 II	Bob's Cottage	--	--	--	--	--	--	Yes	--	--	--
LB 1228268 II	Theberton House Stables	--	--	--	--	--	--	Yes	--	--	--
LB 1228269 II	Gateway 45m north of main entrance to Theberton House	--	--	--	--	--	--	Yes	--	--	--
LB 1228378 II*	Theberton House	--	--	--	--	--	--	Yes	--	--	--
LB 1287235 II	Walls enclosing garden 60m to north of Theberton House and greenhouse at north end	--	--	--	--	--	--	Yes	--	--	--
LB 1287237 II	Gate and gate piers 105m south east of main entrance to Theberton House	--	--	--	--	--	--	Yes	--	--	--
LB 1287303 II	Gate and gate piers at junction of Leiston Road and Onner's Lane	--	--	--	--	--	--	Yes	--	--	--
LB 1287260 II	Gate and gate piers 80m north west of main entrance to Theberton House	--	--	--	--	--	--	Yes	--	--	--
Grade II listed buildings at Potter's Street cross roads											

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1228262 II	The Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1228263 II	Flash Cottages	Yes	--	--	--	--	--	--	--	--	--
LB 1228265 II	Woodview	Yes	--	--	--	--	--	--	--	--	--
Individual assets											
LB 1287643 II	Hill Farmhouse	--	Yes	--	--	--	--	--	--	--	--
LB 1216275 II	Fisher's Farmhouse	--	Yes	--	--	--	--	--	--	--	--
LB 1227752 II	Wood Farmhouse	--	Yes	--	--	--	--	--	--	--	--
Grade II listed buildings at Rattla Corner											
LB 1227755 II	1-4, Church Road	--	--	--	--	--	--	Yes	--	--	--
LB 1227920 II	Lilycot	--	--	--	--	--	--	Yes	--	--	--
Grade I and II listed buildings at Theberton											
LB 1227756 I	Church of St Peter	--	--	--	--	--	--	Yes	--	--	--
LB 1227758 II	The Old Rectory	--	--	--	--	--	--	Yes	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1227759	II Stable block 10m to south of the Lion Public House	--	--	--	--	--	--	Yes	--	--	--
LB 1228180	II Thatched House The Cottage	--	--	--	--	--	--	Yes	--	--	--
LB 1228270	II Barn 30m south east of Old Manor House	--	--	--	--	--	--	Yes	--	--	--
LB 1228384	II Old Manor House	--	--	--	--	--	--	Yes	--	--	--
LB 1287282	II Flint House	--	--	--	--	--	--	Yes	--	--	--
LB 1287533	II The Lion Public House	--	--	--	--	--	--	Yes	--	--	--
Grade II listed buildings at Theberton Hall											
LB 1227753	II Gates, gateway, walling and wall head 30m west of Theberton Hall	--	--	--	--	--	--	Yes	--	--	--
LB 1287529	II Theberton Hall	--	--	--	--	--	--	Yes	--	--	--
Individual asset											
LB 1228246	II Moat Farmhouse	--	--	--	--	--	--	Yes	--	--	--
Conservation area and listed buildings at Thorpeness											
Conservation area	Thorpeness	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1215702 II	Thorpeness Mill	Yes	--	--	--	--	--	--	--	--	--
LB 1228271 II	Ogilvie Almshouses	Yes	--	--	--	--	--	--	--	--	--
LB 1228493 II	3, Westgate	Yes	--	--	--	--	--	--	--	--	--
LB 1228496 II	1, The Whinlands	Yes	--	--	--	--	--	--	--	--	--
LB 1228498 II	8, The Whinlands	Yes	--	--	--	--	--	--	--	--	--
LB 1228546 II	6 and 7, The Whinlands	Yes	--	--	--	--	--	--	--	--	--
LB 1228553 II	9 and 10, The Whinlands	Yes	--	--	--	--	--	--	--	--	--
LB 1287172 II	Westbar	Yes	--	--	--	--	--	--	--	--	--
LB 1287190 II	Cherleigh	Yes	--	--	--	--	--	--	--	--	--
LB 1287214 II	Church of St Mary	Yes	--	--	--	--	--	--	--	--	--
LB 1287261 II	House in the Clouds	Yes	--	--	--	--	--	--	--	--	--
LB 1287262 II	2, Westgate	Yes	--	--	--	--	--	--	--	--	--
Individual asset											

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1199213	II Dovehouse Farmhouse	--	--	--	--	--	--	Yes	--	--	--
Grade II listed buildings at Annesons Corner											
LB 1283470	II Valley Farmhouse Annesons Corner	--	--	--	--	--	--	Yes	--	--	--
LB 1377245	II Farm buildings 30m east of Valley Farmhouse, Annesons Corner	--	--	--	--	--	--	Yes	--	--	--
Individual assets											
LB 1030643	II Hill Farmhouse	--	--	--	--	--	--	Yes	--	--	--
LB 1199326	II Pine Tree Cottage	--	--	--	--	--	--	Yes	--	--	--
Grade II and II* listed buildings at Middleton Moor											
LB 1030645	II Thatched House	--	--	--	--	--	--	Yes	--	--	--
LB 1199307	II* Moor Farmhouse	--	--	--	--	--	--	Yes	--	--	--
LB 1283443	II The Cottage	--	--	--	--	--	--	Yes	--	--	--
Individual asset											
LB 1030680	II Stone Cottage					Yes					

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
	Non-designated coastguard cottages, Dunwich Heath	Yes	--	--	--	--	--	--	--	--	--
Grade II listed buildings at Fordley Hall											
LB 1199224 II	Fordley Hall	--	--	--	--	--	--	Yes	--	--	--
LB 1377244 II	Vale Farmhouse	--	--	--	--	--	--	Yes	--	--	--
Individual asset											
LB 1030593 II	Beveriche Manor Farmhouse	--	--	--	--	--	--	Yes	--	--	--
Conservation area and Grade I, II and II* listed buildings at Aldeburgh											
Conservation area	Aldeburgh	Yes	--	--	--	--	--	--	--	--	--
LB 1247244 II	Number 3 and attached walls to north and east and south including garage	Yes	--	--	--	--	--	--	--	--	--
LB 1269690 II	Group of seven chest tombs approximately 7m east of chancel of Church of St Peter and St Paul	Yes	--	--	--	--	--	--	--	--	--
LB 1269691 II	Group of three chest tombs approximately 11m south east of Church of St Peter and St Paul	Yes	--	--	--	--	--	--	--	--	--
LB 1269692 II	Lifeboat disaster monument approximately 85m north east of the church of St Peter and St Paul	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1269693	II Monument approximately 3m west of north vestry of Church of St Peter and St Paul	Yes	--	--	--	--	--	--	--	--	--
LB 1269694	II Mill Inn	Yes	--	--	--	--	--	--	--	--	--
LB 1269695	II Uplands Hotel	Yes	--	--	--	--	--	--	--	--	--
LB 1269696	II North House	Yes	--	--	--	--	--	--	--	--	--
LB 1269697	II Tiffany House	Yes	--	--	--	--	--	--	--	--	--
LB 1269698	II Garden House 50m west of Tiffany House (Number Three)	Yes	--	--	--	--	--	--	--	--	--
LB 1269711	II Red House	Yes	--	--	--	--	--	--	--	--	--
LB 1269712	II 8-14, Market Cross Place	Yes	--	--	--	--	--	--	--	--	--
LB 1269713	II White Lion Hotel	Yes	--	--	--	--	--	--	--	--	--
LB 1269714	II Market Cross House	Yes	--	--	--	--	--	--	--	--	--
LB 1269715	II Moot House	Yes	--	--	--	--	--	--	--	--	--
LB 1269716	I Moot Hall	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1269717	II Oakley House	Yes	--	--	--	--	--	--	--	--	--
LB 1269718	II Priors Hill	Yes	--	--	--	--	--	--	--	--	--
LB 1269719	II Dolphin House	Yes	--	--	--	--	--	--	--	--	--
LB 1269720	II Sandhill	Yes	--	--	--	--	--	--	--	--	--
LB 1269722	II Water Tower	Yes	--	--	--	--	--	--	--	--	--
LB 1269723	II Aldeburgh Hall	Yes	--	--	--	--	--	--	--	--	--
LB 1269725	II 1 and 3, Town Steps	Yes	--	--	--	--	--	--	--	--	--
LB 1269726	II 2-10, Town Steps	Yes	--	--	--	--	--	--	--	--	--
LB 1269727	II Cherry Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269728	II Water Pump	Yes	--	--	--	--	--	--	--	--	--
LB 1269729	II Wyndham House	Yes	--	--	--	--	--	--	--	--	--
LB 1269730	II Church Farmhouse	Yes	--	--	--	--	--	--	--	--	--
LB 1269731	II* Church of St Peter and St Paul	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1269732	II Bell Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269733	II Dart Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269734	II Aldeburgh Pharmacy	Yes	--	--	--	--	--	--	--	--	--
LB 1269735	II Old Cottage Tyne Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269736	II The Suffolk	Yes	--	--	--	--	--	--	--	--	--
LB 1269737	II 170 and 172, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1269738	II Lewis House	Yes	--	--	--	--	--	--	--	--	--
LB 1269739	II Numbers 213a and 215 incorporating Number 213	Yes	--	--	--	--	--	--	--	--	--
LB 1269740	II Dutch Flat Gosfield Cottage The Nutshell	Yes	--	--	--	--	--	--	--	--	--
LB 1269741	II White Hart Inn	Yes	--	--	--	--	--	--	--	--	--
LB 1269742	II The Old Custom House	Yes	--	--	--	--	--	--	--	--	--
LB 1269743	II Lavender Cottage Rosemary Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269744	II 229 and 229a, High Street	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1269745	II End Cottage The Sun Trap	Yes	--	--	--	--	--	--	--	--	--
LB 1269746	II Cranstons	Yes	--	--	--	--	--	--	--	--	--
LB 1269749	II 259, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1269750	II 267,269,271, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1269751	II Union Baptist Chapel including forecourt railings, gates and gate piers	Yes	--	--	--	--	--	--	--	--	--
LB 1269752	II Half Crown Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269764	II Alde House	Yes	--	--	--	--	--	--	--	--	--
LB 1269765	II Adair Lodge	Yes	--	--	--	--	--	--	--	--	--
LB 1269766	II Thelluson Lodge	Yes	--	--	--	--	--	--	--	--	--
LB 1269767	II Swiss Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1269768	II Cross Keys Inn	Yes	--	--	--	--	--	--	--	--	--
LB 1269769	II Ocean Strand	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1269770 II	Stafford House	Yes	--	--	--	--	--	--	--	--	--
LB 1269771 II	The North Lookout	Yes	--	--	--	--	--	--	--	--	--
LB 1269772 II	The South Lookout	Yes	--	--	--	--	--	--	--	--	--
LB 1269773 II	Crespigny House	Yes	--	--	--	--	--	--	--	--	--
LB 1269774 II	84, High Street	Yes	--	--	--	--	--	--	--	--	--
Individual Assets											
LB 1269724/ SM 1006041 II*	Slaughden Martello Tower	Yes	--	--	--	--	--	--	--	--	--
LB 1377236 II	Rookery Farmhouse	--	--	--	--	--	--	Yes	--	--	--
Conservation area and Grade II and II* listed buildings and parkland at Yoxford											
Conservation area	Yoxford	--	--	--	--	Yes	--	--	--	--	--
LB 1030626 II	Old School Cottages	--	--	--	--	Yes	--	--	--	--	--
LB 1200636 II	Satis House	--	--	--	--	Yes	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1030627 II	The Gables	--	--	--	--	Yes	--	--	--	--	--
LB 1200791 II	Rookery Cottages	--	--	--	--	Yes	--	--	--	--	--
LB 1377237 II	White Lodge and the White House	--	--	--	--	Yes	--	--	--	--	--
YOX 013 (Non designated)	Rookery Park	--	--	--	--	Yes	--	--	--	--	--
YOX 006 (Non designated)	Cockfield Park	--	--	--	--	Yes	--	--	--	--	--
LB 1200647 II	Cockfield Hall Lodge	--	--	--	--	Yes	--	--	--	--	--
Conservation area and Grade I, II and II* listed buildings and non-designated assets at Southwold											
Conservation area	Southwold	Yes	--	--	--	--	--	--	--	--	--
LB 1384310 II	Old Water Tower	Yes	--	--	--	--	--	--	--	--	--
LB 1380274 II	The Studio	Yes	--	--	--	--	--	--	--	--	--
LB 1384311 II	15 and 16, Barnaby Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384312 II	17, Barnaby Green	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384313	II 1 and 2, Bartholomew Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384314	II 3 and 4, Bartholomew Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384315	II 5 and 6, Bartholomew Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384316	II Iona	Yes	--	--	--	--	--	--	--	--	--
LB 1384317	II Vanessa Villa	Yes	--	--	--	--	--	--	--	--	--
LB 1384318	II Oak Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384319	II Churchyard gates approximately 15m south of Church of St Edmund's	Yes	--	--	--	--	--	--	--	--	--
LB 1384321	I Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384322	II Chest tomb approximately 5m south east of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384323	II Headstone to A Nolloth approximately 15m south of chancel of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384324	II Two headstones approximately 12m south east of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384325	II Two headstones approximately 15m east south east of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384326	II Pair of headstones approximately 5m south of porch of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384327	II Bardwell monument approximately 15m south of the chancel of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384328	II Headstone approximately 10m south of porch of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384329	II 1-19, Church Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384330	II 24 and 26, Church Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384331	II Headstone approximately 7m south of porch of Church of St Edmund	Yes	--	--	--	--	--	--	--	--	--
LB 1384332	II Iona Cottage and Iona Flat	Yes	--	--	--	--	--	--	--	--	--
LB 1384333	II Lydstep House and Coign	Yes	--	--	--	--	--	--	--	--	--
LB 1384334	II Rowan Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384335	II Cliff House and Shrimp Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384336	II 5 and 6, East Cliff	Yes	--	--	--	--	--	--	--	--	--
LB 1384337	II 7, East Cliff	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384338	II East Cliff Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384339	II Back to Front Cottage East Cliff House	Yes	--	--	--	--	--	--	--	--	--
LB 1384340	II Bay View (Number 14) and East Cliff (Number 15) and railings attached to front	Yes	--	--	--	--	--	--	--	--	--
LB 1384341	II Sailors' Reading Room	Yes	--	--	--	--	--	--	--	--	--
LB 1384342	II 3-6, East Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384343	II Sole Bay Inn	Yes	--	--	--	--	--	--	--	--	--
LB 1384344	II 8 and 9, East Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384345	II 10, East Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384346	II 2, East Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384347	II Gordon House	Yes	--	--	--	--	--	--	--	--	--
LB 1384348	II Trafalgar Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384349	II Spindrift	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384350	II Reading Room Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384351	II Salt Works Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384352	II Park Lane Cottage Park Lane Cottage West	Yes	--	--	--	--	--	--	--	--	--
LB 1384353	II Gun Hill Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384354	II Stone House	Yes	--	--	--	--	--	--	--	--	--
LB 1384355	II Watch House	Yes	--	--	--	--	--	--	--	--	--
LB 1384356	II Ferndale Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384357	II 13 and 15, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384358	II Barnaby Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384359	II White Horse Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384360	II 20, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384361	II 22, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384362	II King's Head Hotel	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384363	II 25, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384364	II Montague House and railings attached at front	Yes	--	--	--	--	--	--	--	--	--
LB 1384365	II 38 and 60, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384366	II The Old House (Number 49)	Yes	--	--	--	--	--	--	--	--	--
LB 1384367	II 54 and 54a, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384368	II 55-63, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384369	II* Sutherland House	Yes	--	--	--	--	--	--	--	--	--
LB 1384370	II* Manor House and Manor Gate including forecourt walls	Yes	--	--	--	--	--	--	--	--	--
LB 1384371	II 66, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384372	II Olde Banke House	Yes	--	--	--	--	--	--	--	--	--
LB 1384373	II 71, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384374	II Rutland House	Yes	--	--	--	--	--	--	--	--	--
LB 1384375	II* Buckenham House	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384376	II 82 , 84 and 86, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384377	II Crown Hotel	Yes	--	--	--	--	--	--	--	--	--
LB 1384378	II 94, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384379	II 96, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384380	II 98, 98a and 100, High Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384381	II United Reformed Church	Yes	--	--	--	--	--	--	--	--	--
LB 1384382	II 3, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384383	II 10, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384384	II 11 and 13, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384385	II 15, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384386	II* Lloyds Bank	Yes	--	--	--	--	--	--	--	--	--
LB 1384387	II 19, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384388	II 21, Market Place	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384389	II 23, Market Place	Yes	--	--	--	--	--	--	--	--	--
LB 1384390	II 25, Market Place (see details for further address information)	Yes	--	--	--	--	--	--	--	--	--
LB 1384391	II Swan Hotel	Yes	--	--	--	--	--	--	--	--	--
LB 1384392	II Town Hall	Yes	--	--	--	--	--	--	--	--	--
LB 1384393	II Town Pump	Yes	--	--	--	--	--	--	--	--	--
LB 1384394	II Rosemary Cottages	Yes	--	--	--	--	--	--	--	--	--
LB 1384395	II The Old Chapel	Yes	--	--	--	--	--	--	--	--	--
LB 1384396	II Primrose Cottage and Dolphin Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384397	II Bradwell House (Number 6)	Yes	--	--	--	--	--	--	--	--	--
LB 1384398	II 9, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384399	II 10 and 12, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384400	II 13 and 15, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384401	II 14, Park Lane	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384402	II 16 and 18, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384403	II Honeysuckle Cottage (Number 17)	Yes	--	--	--	--	--	--	--	--	--
LB 1384404	II 20, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384405	II 21 and 23, Park Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384406	II Strickland House	Yes	--	--	--	--	--	--	--	--	--
LB 1384407	II Park Lane Cottage Park Lane Cottage West	Yes	--	--	--	--	--	--	--	--	--
LB 1384408	II 6, Pinkney's Lane	Yes	--	--	--	--	--	--	--	--	--
LB 1384409	II The Elms (Number 1)	Yes	--	--	--	--	--	--	--	--	--
LB 1384410	II 4 and 6, Queen Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384411	II Evington	Yes	--	--	--	--	--	--	--	--	--
LB 1384412	II Holmwood	Yes	--	--	--	--	--	--	--	--	--
LB 1384413	II 10, Queen Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384414	II 12, Queen Street	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384415	II 14, Queen Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384416	II 16, Queen Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384417	II 18, Queen Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384418	II Coachman's Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384419	II 6, Queen's Road	Yes	--	--	--	--	--	--	--	--	--
LB 1384420	II 8, Queen's Road	Yes	--	--	--	--	--	--	--	--	--
LB 1384421	II The Bolt Hole and Wayside Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384422	II Whitehall and Guardship	Yes	--	--	--	--	--	--	--	--	--
LB 1384423	II Greyfriars North and Greyfriars South and Regency House	Yes	--	--	--	--	--	--	--	--	--
LB 1384424	II Red Lion Inn	Yes	--	--	--	--	--	--	--	--	--
LB 1384425	II Sole Bay Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384426	II South Green Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384427	II 7, South Green	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384428	II South Green House	Yes	--	--	--	--	--	--	--	--	--
LB 1384429	II 10a, 10b, 10c and 10d, South Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384430	II Dartmouth Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384431	II South House	Yes	--	--	--	--	--	--	--	--	--
LB 1384432	II Wellesley Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384433	II 14 and 14a, South Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384434	II Providence Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384435	II The Retreat and Pin Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384436	II 24, South Green	Yes	--	--	--	--	--	--	--	--	--
LB 1384437	II Tudor Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384438	II Hill House and Woldside	Yes	--	--	--	--	--	--	--	--	--
LB 1384439	II Adnams Wine Merchants	Yes	--	--	--	--	--	--	--	--	--
LB 1384440	II Cannon Lodge	Yes	--	--	--	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1384441	II Centre Cliff	Yes	--	--	--	--	--	--	--	--	--
LB 1384442	II Centre Cliff	Yes	--	--	--	--	--	--	--	--	--
LB 1384443	II May Place Cottage (Number 7a)	Yes	--	--	--	--	--	--	--	--	--
LB 1384444	II The Lighthouse	Yes	--	--	--	--	--	--	--	--	--
LB 1384445	II 8, Trinity Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384446	II 10, Trinity Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384447	II Trinity Cottage	Yes	--	--	--	--	--	--	--	--	--
LB 1384448	II Lantern Cottage (Number 52)	Yes	--	--	--	--	--	--	--	--	--
LB 1384449	II 75 and 77, Victoria Street	Yes	--	--	--	--	--	--	--	--	--
LB 1384450	II Southwold Museum	Yes	--	--	--	--	--	--	--	--	--
LB 1384451	II Church of the Sacred Heart and attached Presbytery	Yes	--	--	--	--	--	--	--	--	--
	Southwold Pier	Yes	--	--	--	--	--	--	--	--	--
Individual assets											

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
SM 1014860	Orford Castle with adjoining quarry and remains of 20th century look-out post	Yes	--	--	--	--	--	--	--	--	--
Scheduled and Grade II listed lighthouse and former military structures at Orford Ness											
LB 1392631	Orfordness Lighthouse	Yes	--	--	--	--	--	--	--	--	--
LB 1416866	Orford Ness: former Royal Flying Corps barrack block	Yes	--	--	--	--	--	--	--	--	--
LB 1416867	Orford Ness: former RFC Officers' Mess and AWRE canteen building	Yes	--	--	--	--	--	--	--	--	--
LB 1416868	Orford Ness: the Black Beacon and associated power house	Yes	--	--	--	--	--	--	--	--	--
LB 1416869	Orford Ness: bomb ballistics building	Yes	--	--	--	--	--	--	--	--	--
SM 1416933	Orford Ness: the atomic weapons research establishment test buildings and associated structures	Yes	--	--	--	--	--	--	--	--	--
Listed buildings at Stratford St Andrew and Farnham											
LB 1230210	Farnham Manor	--	--	--	--	--	Yes	--	--	--	--
LB 1230211	Church of St Mary	--	--	--	--	--	Yes	--	--	--	--
LB 1230213	Elm Tree Farmhouse	--	--	--	--	--	Yes	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1230214	II Elm Tree Cottage	--	--	--	--	--	Yes	--	--	--	--
LB 1230215	II Post Office Stores	--	--	--	--	--	Yes	--	--	--	--
LB 1230216	II George and Dragon	--	--	--	--	--	Yes	--	--	--	--
LB 1230217	II Turret Cottage, Turret House	--	--	--	--	--	Yes	--	--	--	--
LB 1231407	II* Church of St Andrew	--	--	--	--	--	Yes	--	--	--	--
LB 1278123	II Four cottages 30m south of St Andrew's Church	--	--	--	--	--	Yes	--	--	--	--
LB 1377115	II Benhallstock Cottages	--	--	--	--	--	Yes	--	--	--	--
Glemham Hall Park and associated listed buildings											
RPG 1001461	II Glemham Park	--	--	--	--	--	Yes	--	--	--	--
LB 1230629	II Retaining wall Of ha-ha 30m west Of Little Glemham Hall	--	--	--	--	--	Yes	--	--	--	--
LB 1230800	II Garden walling to south Of Little Glemham Hall	--	--	--	--	--	Yes	--	--	--	--
LB 1278406	II Lodge at entrance to Little Glemham Hall	--	--	--	--	--	Yes	--	--	--	--
LB 1278438	II Little Glemham Hall Stables	--	--	--	--	--	Yes	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1278507 I	Little Glemham Hall	--	--	--	--	--	Yes	--	--	--	--
Individual assets											
1011339–44	Bowl barrows and ring ditches	--	--	--	--	--	--	--	Yes	--	--
LB1030833	Gleivering Bridge	--	--	--	--	Yes	--	--	--	--	--
FNM 022 (non designated - HER)	Ponds Barn	--	--	--	--	--	Yes	--	--	--	--
Wickham Market conservation area and associated listed buildings											
	Wickham Market conservation area	--	--	--	Yes	--	--	--	--	--	--
LB 1198652 II	The Crooked House	--	--	--	Yes	--	--	--	--	--	--
LB 1198662 II	181, High Street	--	--	--	Yes	--	--	--	--	--	--
LB 1377140 II	The Chequers Inn	--	--	--	Yes	--	--	--	--	--	--
LB 1377143 II	177-179, High Street	--	--	--	Yes	--	--	--	--	--	--
LB 1030843 II	183 and 187, High Street	--	--	--	Yes	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1283798 II	Deben Lodge	--	--	--	Yes	--	--	--	--	--	--
LB 1198671 II	201 and 203, High Street	--	--	--	Yes	--	--	--	--	--	--
LB 1030839 II	Bridge 20m south of Wickham Mill (including attached railings)	--	--	--	Yes	--	--	--	--	--	--
LB II* 1198526	Wickham Mill	--	--	--	Yes	--	--	--	--	--	--
LB 1199653 II	Bridge 20m south of Wickham Mill (including attached railings)	--	--	--	Yes	--	--	--	--	--	--
LB 1377282 II	Former steam mill 20m south east of Wickham Mill	--	--	--	Yes	--	--	--	--	--	--
LB 1030838 II	240, High Street	--	--	--	Yes	--	--	--	--	--	--
LB 1030557 II	Bridge Farmhouse	--	--	--	Yes	--	--	--	--	--	--
Listed buildings at Lower Hacheston											
LB 1377280 II	Ash Cottage	--	--	--	Yes	--	--	--	--	--	--
LB 1199354 II	36, Ash Road	--	--	--	Yes	--	--	--	--	--	--
Listed buildings at Hacheston											
LB 1199742 I	Church of All Saints	--	--	--	Yes	--	--	--	--	--	--

HE Reference	Asset	Sites									
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative
LB 1377285	II Church Cottage	--	--	--	Yes	--	--	--	--	--	--
LB 1392095	II Mausoleum 25m north of Church of All Saints	--	--	--	Yes	--	--	--	--	--	--
Marlesford Conservation Area and associated listed buildings											
	Marlesford conservation area	--	--	--	Yes	--	--	--	--	--	--
LB 1278312	I Church of St Andrew	--	--	--	Yes	--	--	--	--	--	--
LB 1231066	II Holly Cottages	--	--	--	Yes	--	--	--	--	--	--
LB 1278409	II The Rectory	--	--	--	Yes	--	--	--	--	--	--
LB 1231065	II Shadyside	--	--	--	Yes	--	--	--	--	--	--
LB 1230837	II 26 and 27, Low Road	--	--	--	Yes	--	--	--	--	--	--
LB 1231063	II April Cottage	--	--	--	Yes	--	--	--	--	--	--
LB 1278410	II Poplar Farmhouse	--	--	--	Yes	--	--	--	--	--	--
LB 1230836	II 17-19, Low Road	--	--	--	Yes	--	--	--	--	--	--
LB 1231059	II Wells Cottage	--	--	--	Yes	--	--	--	--	--	--

HE Reference	Asset	Sites										
		Main site	Green rail	Darsham park and ride	Wickham park and ride	Yoxford and road improvements	Two village bypass	Sizewell link road	Freight management	Rail improvements	Cumulative	
Individual Assets												
LB 1030559	II The Rookery	--	--	--	Yes	--	--	--	--	--	--	
Listed buildings at Marlesford Main Road												
LB 1231067	II 9 and 10, Main Road	--	--	--	Yes	--	--	--	--	--	--	
LB 1231068	II Bridge House	--	--	--	Yes	--	--	--	--	--	--	
LB 1231069	II Bell Inn	--	--	--	Yes	--	--	--	--	--	--	
LB 1278281	II Old Post Office	--	--	--	Yes	--	--	--	--	--	--	
Individual Assets												
LB 1030664	II Oak Hall	--	--	Yes	--	--	--	--	--	--	--	
LB 1198815	II Darsham Old Hall	--	--	Yes	--	--	--	--	--	--	--	

Appendix B: UK EPR Sizewell C – Historic Environment – 2015 Settings Assessment

NOT PROTECTIVELY MARKED



UK EPR Sizewell C

Historic Environment: Settings Assessment Scoping Recommendations

Document Control System Fusion 4

NOT PROTECTIVELY MARKED

34679-C-016

Issue 02

September 2015

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Executive Summary

This report sets out proposals for the scope of assessment of potential effects arising from change in the setting of heritage assets caused by the construction and operation of the proposed Sizewell C Nuclear Power Station.

A summary of the baseline is set out, describing the prevailing historic landscape character and characterising the types of heritage assets identified within the study area. The types of change anticipated are then described and general comments are provided on the potential likelihood and magnitude of change.

This report also summarises the results of an appraisal which has been undertaken to identify receptors for which further assessment is required in order to fully understand the potential for any significant adverse effects. The results of this appraisal are presented in more detail at Appendix A.

1 Introduction

- 1.1.1 The purpose of this scoping note is to identify the heritage assets which are potentially subject to significant adverse effects arising from change to setting as a result of the construction and operation of the proposed Sizewell C Power Station and Associated Development. The note has been prepared following an initial phase of consultation and is intended to form the basis for a detailed scope of assessment of effects arising through change to setting of heritage assets which can be agreed with the following consultees:
- Historic England;
 - Suffolk County Council Archaeological Service;
 - The Suffolk Coastal District Council Design and Conservation Officer; and
 - The Waveney District Council Design and Conservation Officer.
- 1.1.2 This note comprises an appraisal of the potential effects of the proposed development and a proposed scope of further assessment. The aim of this appraisal was to develop a focused and robust scope of assessment to allow the requirement set out in paragraph 128 of National Planning Policy Framework (NPPF) for an assessment which is '*...proportionate to the assets importance and no more than is sufficient to understand the potential impact of the proposal...*'.
- 1.1.3 The Sizewell C: Historic Environment - Designated Heritage Assets Baseline (Initial Setting Considerations) document (AMEC 2012) considered designated heritage assets within an initial study area defined to the north by the River Blyth (but also including Southwold and Covehithe), the west by the A12 and to the South by the River Alde. Subsequent consultation on this report with English Heritage (now Historic England) and Suffolk County Council identified a requirement to consider the effects of the proposed development on designated and undesignated heritage assets further to the south at Orford and Orford Ness. Since that time a number of previously undesignated heritage assets on Orford Ness have been Listed or Scheduled; these assets are identified at Appendix A.
- 1.1.4 A further search of heritage assets with settings which could be affected by the proposed Associated Development sites at Wickham Market and Farnham was undertaken. This considered designated heritage assets within approximately 1.5km of the proposed developments and was informed by the archaeological desk-based assessments carried out for these sites (AMEC, 2015a) A third Associated Development site at Darsham was already within the study area considered for the main power station site development (AMEC, 2015b).
- 1.1.5 Subsequent consultation meetings and site visits were held with officers from Suffolk Coastal District Council and Waveney District Council and English Heritage (now known as Historic England from 1st April 2015). While discussion focused on the conservation areas at Southwold, Aldeburgh and Thorpeness, consideration of the potential settings impacts (if any) on the non-designated Dower House south of Sizewell Hall was requested. Reference was

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also made to the setting of the windpump at Westwood Marshes, Walberswick, which is currently being restored.

- 1.1.6 In addition to the sources referenced in the initial settings report (AMEC, 2012), reference has been made to the documents listed in the references section of this note, many of which were not available at the time of that study.
- 1.1.7 The appraisal presented below considers historic landscape character, the assets and the potential effects of the proposed development to develop a comprehensive list of assets which are recommended to be taken forward to more detailed assessment within the scope of the Environmental Impact Assessment process and also to identify those which should be 'scoped out'. Summary rationales for the decisions to scope assets in or out of the EIA process are given at Appendix A, and opportunities for supporting visualisations have been identified where these would aid the assessment process.
- 1.1.8 This scoping note is in accordance with Step One – 'identifying the assets involved' – of the 5-step methodology set out for the assessment of change to setting as set out in the English Heritage (2014) Historic Environment Good Practice in Planning Advice Note GPA 3 *The Setting of Heritage Assets*, which supersedes English Heritage (2011) *The Setting of Heritage Assets*.

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2 Baseline

2.1 Summary of Historic Landscape Character

- 2.1.1 The study area comprises a variety of land uses and topographies. In general, more undulating arable landscapes in the west give way to sandy landscapes in the east, known as the Sandlings, and areas of coastal marshland, particularly around Westwood, Minsmere and Sudbourne. This summary is based on work presented in a standalone historic landscape assessment (AMEC, 2015b).
- 2.1.2 The coastal landscape in particular has been subject to enormous environmental and anthropogenic change since the medieval period; episodes of coastal erosion and accretion have resulted in the loss of the medieval town of Dunwich and the formation of Orford Ness.
- 2.1.3 The coast is characterised by the presence of large areas of marshland. These marshes are generally flat and open, with clear views which are only occasionally constrained by more recent plantation. There are relatively few designated heritage assets in these areas, and those which are present generally relate to agricultural use or improvement of the marsh. The notable exception is the former site of Leiston Abbey. Larger coastal settlements are generally located on higher ground close to the mouths of navigable (or formerly navigable) rivers.
- 2.1.4 Immediately inland, the Sandlings have been subject to various phases of cultivation and use as pasturage, with more recent attempts to re-establish areas of heathland landscape and to regenerate ancient woodland. Much of this area comprises relatively open agricultural land with sparse hedgerow planting and scattered smaller patches of woodland, or heathland with dense but low planting, but there are a number of larger woods and plantations. Historic settlement of this area has also been generally sparse, with a number of smaller agricultural settlements.
- 2.1.5 The arable land located on the clay soils to the west of the Sandlings has been subject to change over a number of phases of 'improvement' and inclosure over the last three centuries. This has affected defining historic landscape elements such as the size of fields, with hedgerow loss and the frequent loss of mature trees within those hedgerows which have been retained. There are still some substantial areas of woodland, and shelter planting which, coupled with the undulating nature of the terrain, restrict the number of long views and mean that the horizon is broken by patches of woodland. Settlement in this area is a mixture of smaller agricultural settlements and larger villages and small towns.

2.2 Summary of Asset Types

- 2.2.1 To summarise, the majority of heritage assets considered below fall into one of the following categories:

- (1) Anglican churches:

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- These assets are set within churchyards containing associated burials and structures, often having substantial and mature screening planting. They also often have associated designated funerary monuments, which form discrete asset groupings. Most are within or closely associated with larger settlements, though some are more distant from these settlements. Views from these assets beyond their immediate surroundings tend not to contribute substantially to their significance, but views towards these assets can be more important where their towers are discernible over longer distances.

(2) Village and town buildings:

- The settings of these assets tend to be defined by their immediate surroundings, with adjacent structures providing context and precluding more distant views.
- The inter-relation of these assets is recognised in some cases by the designation of Conservation Areas, which reflect the contribution of the overall composition and the contribution of non-designated structures to the historic character of the settlement.
- The study area includes a number of seaside resorts and coastal settlements which are characterised by views out to sea and in either direction along the coast. The nature of the Suffolk coast means that these views are often over long distances. These views have been, in places, exploited through the construction of promenades or greens to allow these longer views to be enjoyed.
- These settlements may also include distinctive landmark structures such as the House in the Clouds and West Bar at Thorpeness.

(3) Coastal and defensive structures:

- These assets include lighthouses and castles, Martello towers and the nuclear-era structures at Orford Ness, as well as smaller structures such as pill-boxes.
- These structures date from a wide range of chronological periods, but share a relationship with the sea and coastal settlements. They are frequently visible from a long distance, and visibility from these assets may also contribute to their setting.

(4) Isolated farmsteads, agricultural buildings and chapels

- The settings of these assets tend to be defined by the relationship with adjacent ancillary buildings (in the case of farmhouses and agricultural buildings) and with adjacent agricultural land. They are frequently at least partially screened by hedgerow and shelter planting, while historic associations and tenurial links relate to the area immediately around these assets. Longer views tend not to make a substantial positive contribution to the significance of these assets except in providing a sense of place.

(5) Prehistoric funerary monuments

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- The settings of these assets are complex and frequently much changed from any perceived or conjectured 'contemporary' context and the effect of this change on any conception of their significance must also be taken into account. There is often little consensus on the place of these assets within the past landscape and the nature of that landscape is frequently poorly understood. However, these assets are often located in positions which suggest that visibility of or from these assets may have contributed to their meaning.

(6) Elite houses and associated designed landscapes

- The character and settings of these assets are complex and varied. While rural designed landscapes are frequently well-screened and clearly defined from surrounding agricultural land, there are frequently designed and fortuitous visual or associative links to areas outside the designed landscape, which may or may not be designated. Consequently, these assets may be very sensitive to nearby development depending on their individual character.

(7) Abandoned or reused monastic sites

- These assets represent former monastic sites which were either abandoned or adapted following the Dissolution. They are represented by largely ruinous survivals of much larger building complexes, with elements surviving where they were retained in agricultural or ecclesiastical use. These ruins are frequently picturesque and evocative and have strong associative links with the landscape immediately around them.

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3 Proposed development

3.1 Summary of effects of proposed development

- 3.1.1 While setting is not a solely visual concept, it is likely that the greatest perceptual change to the settings of heritage assets will arise from the visibility of the proposed development in views of or from those heritage assets, except in those assets closest to the proposed development.
- 3.1.2 The nature of the landscape around the proposed power station site suggests that visibility of this aspect of the development will be restricted by the rising ground and plantation to the west of the power station. Consequently, it is likely that visual change sufficient to give rise to potentially significant adverse effects arising from the construction of the proposed power station will primarily arise on assets along the coast to the north and south of the proposed development. The scale of the proposed development, however, means that these effects could occur even at comparatively large distances from the development.
- 3.1.3 Other elements of the proposed development, including the accommodation campus, and road and rail access routes also have the potential to give rise to significant adverse effects through material change to setting, although these effects are likely to be localised as a result of their reduced scale compared to the main power station development.
- 3.1.4 Alteration to traffic levels along the road access routes also has the potential to give rise to perceptual change in the settings of heritage assets or to exacerbate adverse change caused by road reconfiguration or widening. This change is most likely to give rise to significant adverse effects where increase in traffic volumes is greatest; consequently, perceptual change to setting along the A12, is generally less likely to be significant than change along the B1122 transport route.

4 Assessment of Settings

4.1 Proposed Scope of 'Settings' Assessment

4.1.1 Taking the considerations identified above into account, a proposed scope of assessment of effects on the significance of heritage assets arising through change to setting is set out below. Where a number of assets can be functionally or geographically linked, these have been considered as groups for the purposes of this exercise; this is intended to reflect a desire to acknowledge common aspects in the settings of these assets and to avoid unnecessary repetition of descriptive data. Where effects on the setting of assets within the group are considered likely to vary, these will be considered individually. Individual assets within these groups have been identified at Appendix A.

4.1.2 Assets that will be considered within the Assessment are:

- Grade II Listed buildings and associated non-designated structures at Upper Abbey Farm;
- Cottage 450m west of Upper Abbey Farmhouse (Abbey Cottage – LB II 1216395);
- Potter's Farmhouse (LB II 1228267);
- Leiston Abbey (first site) with later chapel and pillbox (SM 1015687);
- The Watch House, Sizewell (LB II 1391360);
- Scheduled Monument, Grade I and Grade II Listed buildings at Leiston Abbey;
- Grade II and II* Listed Buildings and non-designated designed landscape at Theberton House;
- Grade II Listed Buildings at Potter's Street crossroads;
- Fisher's Farmhouse (LB II 1216275);
- Grade I and II Listed Buildings at Theberton;
- Conservation Area and Grade II and II* listed buildings at Leiston;
- Conservation Area and Listed Buildings at Thorpeness;
- Grade II listed Buildings at Anneson's Corner;
- Hill Farmhouse (LBII 1030643);
- Pine Tree Cottage (LB II 1199326);
- Grade II and II* Listed Buildings at Middleton Moor;

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- Non-designated coastguard cottages, Dunwich Heath;
- Rookery Cottage (LB II 1200791);
- Conservation Area, scheduled monument and Grade I, II and II* Listed Buildings at Aldeburgh;
- Slaughden Martello Tower (LB II* 1269724/ SM 1006041);
- Conservation Area and Grade II and II* Listed Buildings at Yoxford;
- Conservation Area and Grade I, II and II* Listed Buildings and non-designated assets at Southwold;
- Conservation Area, Scheduled Monument and Grade I and II Listed Buildings at Orford;
- Grade II listed lighthouse, scheduled and listed military structures at Orford Ness;
- Grade II and II* Listed Buildings at Stratford St Andrew and Farnham; and
- Conservation area and Grade I, II and II* listed buildings at Blythburgh.

4.1.3 Other heritage assets are not likely to be subject to any discernible adverse effects. They are therefore scoped out of the assessment and will not be considered further.

4.1.4 Illustrative photography will be supplied to support the assessment of effects on heritage assets where required. The locations of viewpoint photography at Leiston Abbey (first and second sites). Orford Castle, Orford Ness and Aldeburgh Moot Hall have been agreed with Historic England. The locations of viewpoint photography for Southwold and Aldeburgh Conservation Areas have been agreed with the respective District Conservation Officers. Reference will also be made to relevant visualisations carried out for the Landscape and Visual Impact Assessment to support the assessment of effects on heritage assets as appropriate.

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5 References

AMEC 2012 *Sizewell C: Historic Environment – Designated Heritage Assets Baseline (Initial Settings Considerations)*

AMEC 2015a *Farnham Bypass: Archaeological Desk Based Assessment*

AMEC 2015b *Darsham Bypass: Archaeological Desk Based Assessment*

AMEC 2015c *Sizewell C: Historic Landscape Study*

English Heritage 2011 *The Setting of Heritage Assets*

English Heritage 2014 *Historic Environment Good Practice in Planning Advice Note GPA3*

Oxford Archaeology 2007 *England's Historic Seascapes Pilot Study: Southwold to Clacton Final Project Report*

Suffolk Coastal District Council 2010 *Westleton Conservation Area Appraisal*

Suffolk Coastal District Council 2010 *Yoxford Conservation Area Appraisal*

Suffolk Coastal District Council 2010 *Orford Conservation Area Appraisal*

Suffolk Coastal District Council 2010 *Thorpeness Conservation Area Appraisal*

Suffolk Coastal District Council 2012 *Blythburgh Conservation Area Appraisal*

Suffolk Coastal District Council 2012 *Darsham Conservation Area Appraisal*

Suffolk Coastal District Council 2013 *Walberswick Conservation Area Appraisal*

Suffolk Coastal District Council 2013 *Aldeburgh Conservation Area Appraisal*

Suffolk Coastal District Council 2013 *Dunwich Conservation Area Appraisal*

Suffolk Coastal District Council 2014 *Leiston Conservation Area Appraisal*

Suffolk County Council 2007 *The Archaeology of the Suffolk Coast*

Suffolk County Council 2008 *The Suffolk Historic Landscape Characterisation Map*

Waveney District Council 2008 *Southwold Conservation Area Appraisal*

Waveney District Council 2008 *Southwold Conservation Area Management Plan*

Waveney District Council 2008 *Southwold Harbour and Walberswick Quay Conservation Area Appraisal*

Waveney District Council 2008 *Southwold Harbour and Walberswick Quay Conservation Area Management Plan*

Appendix A Summary of Heritage Assets to be included within Scope of Assessment

ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
Grade II Listed Buildings at Upper Abbey Farm		Yes	Proximity to proposed accommodation campus and the site entrance
LB II 1216394	Upper Abbey Farmhouse		
LB II 1216655	Barn 40 Metres North Of Upper Abbey Farmhouse		
LB II 1216395	Cottage 450m West of Upper Abbey Farmhouse (Abbey Cottage)	Yes	Proximity to proposed accommodation campus
LB II 1228267	Potter's Farmhouse	Yes	Proximity to proposed accommodation campus
SM 1015687	Leiston Abbey (first site) with later chapel and pillbox	Yes	Proximity to proposed power station
LB II 1391360	The Watch-House, Sizewell	Yes	Proximity to proposed power station
Scheduled Monument and Grade I and II Listed buildings at Leiston Abbey		Yes	Proximity to proposed accommodation campus, construction site entrance, and rail route
SM 1014520	Leiston Abbey (second site) and moated site		
LB I 1215753	St Mary's Abbey		
LB II 1215754	Retreat House		
LB II 1216380	Barn at Abbey Farm		
LB II 1268290	The Guesten Hall at Abbey Farm		
Grade II and II* Listed Buildings and non-designated parkland at Theberton House		Yes	Proximity to proposed accommodation campus and road access
LB II 1228266	Bob's Cottage		
LB II 1228268	Theberton House Stables		
LB II 1228269	Gateway 45 metres north of main entrance to Theberton House		
LB II* 1228378	Theberton House		
LB II 1287235	Walls enclosing garden 60 metres to north of Theberton House and greenhouse at north end		
LB II 1287237	Gate and gate piers 105 metres south east of main entrance to Theberton House		
LB II 1287303	Gate and gate piers at junction of Leiston Road and Onner's Lane		
LB II 1287260	Gate and gate piers 80 metres north west of main entrance to Theberton House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
Grade II Listed Buildings at Potter's Street cross roads		Yes	Proximity to proposed accommodation campus and rail routes
LB II 1228262	The Cottage		
LB II 1228263	Flash Cottages		
LB II 1228265	Woodview		
Grade II Listed Buildings at Eastbridge		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; assets are located away from proposed road and rail access routes.
LB II 1227936	The Old Thatched Cottage		
LB II 1287530	Sweet Briar Cottage		
LB II 1287643	Hill Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1216275	Fisher's Farmhouse	Yes	Proximity to proposed rail route
Conservation Area and Listed Buildings at Leiston		No	These settings of these assets are defined by their immediate surroundings and relationships to adjacent designated and non-designated structures in the area. Views from these assets would be largely screened by other buildings and shelter planting. The proposed development may be visible in a small number of views from a small number of the assets within the group, but not with sufficient prominence to give rise to significant adverse effects
Conservation Area	Leiston		
LB II 1215806	Ogilvie Homes		
LB II 1216389	Barkwith House		
LB II 1216390	Works House		
LB II 1216614	Red House		
LB II 1216642	Greyshott House		
LB II 1227725	Friends Meeting House		
LB II 1227751	Leiston Hall		
LB II 1227752	Wood Farmhouse		
LB II 1287526	Memorial 22 metres south of the east end of St Margaret's Church		
LB II 1287527	The Cupola		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1287528	24, Westward Ho		
LB II 1287544	Angel Cottage		
LB II* 1287610	The Long Shop		
LB II 1287630	High Green		
LB II 1287644	High Green		
LB II 1287645	Water Tower		
LB II 1287647	White Horse Hotel		
LB II* 1287648	Church of St Margaret		
SM 1011440	Bowl barrow on Aldringham Common, 300m east of Stone House	No	Assets are located within perceptually enclosed setting in heathland surrounded by plantation. Visibility of the proposed development will be filtered by adjacent shelter planting and any perceptual change will be insufficient to give rise to significant adverse effects.
Grade II Listed Buildings at Rattla Corner		No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1227755	1-4, Church Road		
LB II 1227920	Lilycot		
LB II 1030688	Scott's Hall	No	Asset is located within perceptually enclosed setting on fringes of plantation woodland. Some filtered views to proposed power station may be possible but would appear clearly separated from asset in views in which the existing Sizewell power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
Grade I and II Listed Buildings at Theberton		Yes	Proximity to proposed road access along B1122
LB I 1227756	Church of St Peter		
LB II 1227758	The Old Rectory		
LB II 1227759	Stable block 10 metres to south of the Lion Public House		
LB II 1228180	Thatched House The Cottage		
LB II 1228270	Barn 30 metres south east of Old Manor House		
LB II 1228384	Old Manor House		
LB II 1287282	Flint House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1287533	The Lion Public House		
Grade II Listed Buildings at Theberton Hall		No	Visibility of built elements of proposed development will be insufficient to give rise to any perceptible change to setting; asset is well screened from proposed road access along B1122. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1227753	Gates, gateway, walling and wall head 30 metres west of Theberton Hall		
LB II 1287529	Theberton Hall		
LB II* 1287646	Leiston House Farmhouse	No	Setting of asset is defined by relationship to agricultural land and farm buildings. Asset is close to existing rail route and proposed new rail access would present an incremental change in the setting which would be insufficient to give rise to significant adverse effects.
LB II 1228246	Moat Farmhouse	No	Setting of asset is defined by relationship to agricultural land and farm buildings. Any perceptual change will be insufficient to give rise to significant adverse effects.
Grade II Listed Buildings at Coldfair Green		No	Setting of assets is defined by relationship to agricultural land and buildings. Built elements of proposed development will be visible in some views from the asset group but as distant background features in elements of the view in which the existing power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1215755	Cherry Tree Farmhouse		
LB II 1216388	Two adjoining farm buildings immediately south west of Cherry Tree Farmhouse		
LB II 1216507	Bedwells		
LB II 1287747	Romany's rest		
Scheduled bowl barrows and Grade II Listed Buildings at Aldringham		No	Setting of assets is defined by relationship to agricultural land and buildings. Bowl barrows are located within golf course. Built elements of proposed development may be visible in some views from the asset group but as distant background features in elements of the view in which the existing power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
SM 1011378	Two bowl barrows on Aldringham Green		
LB II 1215727	The Parrot And Punchbowl Public		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
	House		
LB II 1215735	Southview		
LB II 1215788	Elm Tree Farmhouse		
LB II 1393143	Aldringham Court		
SM 1011376	Two bowl barrows in Square Plantation	No	Assets are located in perceptually enclosed woodland setting and are not readily discernible as discrete features. Present setting makes a minimal contribution to their significance and views to proposed development are precluded. Any perceptual change will be insufficient to give rise to significant adverse effects.
	Grade II Listed Buildings at Church Farm	No	Views towards proposed development are precluded by intervening planting; setting is defined by relationship to open agricultural land to south of assets. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II	The Ogilvie Almshouses		
LB II	Church of St Andrew		
Conservation Area and Listed Buildings at Thorpeness		Yes	Views from asset group at ground level towards proposed development are precluded by planting and buildings. The Conservation Area includes taller landmark structures including The House in the Clouds, Thorpeness Mill and West Bar, which are clearly visible in a number of longer views. The proposed development may be juxtaposed in views, detracting from the prominence and significance of these taller structures.
Conservation Area	Thorpeness		
LB II 1215702	Thorpeness Mill		
LB II 1228271	Ogilvie Almshouses		
LB II 1228493	3, Westgate		
LB II 1228496	1, The Whinlands		
LB II 1228498	8, The Whinlands		
LB II 1228546	6 and 7, The Whinlands		
LB II 1228553	9 and 10, The Whinlands		
LB II 1287172	Westbar		
LB II 1287190	Cherleigh		
LB II 1287214	Church of St Mary		
LB II 1287261	House in the Clouds		
LB II 1287262	2, Westgate		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1228393	The Pantiles	No	Setting of assets is defined by relationship to agricultural land and adjacent buildings. Built elements of proposed development may be visible in some views from the asset but as distant background features in filtered views in which the existing power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
Grade II and II* Listed Buildings at Knodishall		No	Setting of assets is defined by relationship to agricultural land and adjacent buildings. Built elements of proposed development may be visible in some views from the asset but as distant background features in filtered views in which the existing power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II* 1215745	Church of St Lawrence		
LB II 1287793	Knodishall Place		
LB II 1287532	Crosswing Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Asset is close to existing rail access and views to new rail access are precluded by strong shelter planting to the east of the asset. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1227893	Westhouse Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Asset is close to existing rail access and views to new rail access are precluded by agricultural buildings north of the asset and shelter planting to the east of the asset. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1199213	Dovehouse Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II Listed Buildings at Annesons Corner		Yes	Setting of assets is defined by relationship to A12 major road agricultural land and nearby buildings. Any perceptual change would arise from potential noise generated by increased vehicle traffic along the B1122.
LB II 1283470	Valley Farmhouse Annesons Corner		
LB II 1377245	Farm buildings 30 metres east of Valley Farmhouse, Annesons Corner		

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Sizewell C: Historic Environment Settings Assessment Scoping Recommendations

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1030643	Hill Farmhouse	Yes	Setting of asset is defined by relationship to agricultural land and nearby buildings. Any perceptual change will arise from increased vehicle traffic along the B1122 which may be sufficient to give rise to significant adverse effects..
LB II 1030644	Fenn Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1283440	Manor House	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II and II* Listed Buildings at Middleton		No	Setting of assets is defined by relationship to adjacent buildings and agricultural land. These assets are sufficiently distant from the B1122 for increased traffic noise to not give rise to sufficient perceptual change to give rise to significant adverse effects.
LB II1030646	Rectory Cottages		
LB II* 1030647	Holy Trinity Church		
LB II 1030648	Tegernsee		
LB II 1199334	The Stone House		
LB II 1199344	Methodist Chapel		
LB II 1283433	Bell Inn		
LB II 1377247	Marsh Acres		
LB II 1377248	Lavender Cottage		
LB II 1199175	Peakhill Cottages	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Conservation Area and Grade II and II* Listed Buildings at Westleton		No	The settings of these assets are defined by their immediate relationships to adjacent designated and non-designated structures in the area. Views from these assets would be largely precluded by buildings. Any perceptual change will be insufficient to give rise to significant adverse effects.
Conservation Area	Westleton		
LB II 1030690	Village Hall		
LB II 1030691	Crown Inn		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1030692	The Grange		
LB II 1198558	Lavender Cottage		
LB II 1198585	Mulley's Cottage		
LB II 1198596	The Old School House		
LB II 1198621	Holly Tree Cottage		
LB II 1198627	Moor House		
LB II* 1283793	St Peter's Church		
LB II 1377228	Vine Cottage		
LB II 1377229	Apple Tree Cottage South West Cottage		
LB II 1391780	The Croft		
LB II 1392677	Cottages to the NE of Westleton Grange		
LB II 1030689	Vale House	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1199326	Pine Tree Cottage	Yes	Setting of asset is defined by relationship to agricultural land and nearby buildings. Any perceptual change will arise from increased vehicle traffic along the B1122 which may be sufficient to give rise to significant diverse effects..
LB II 1030642	Packway Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1216081	Billeaford Hall	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II* 1215749	Buxlow Manor	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1287772	Pattle's Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1215743	Little Moor Farm	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1269753	Gorsehill	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening shelter planting to the north of the asset, and the proposed development would not be visible in juxtaposition with the asset. Heavily filtered views may be possible from upper floors of the asset; asset is located away from proposed road and rail access routes. Any perceptual change will be insufficient to give rise to significant adverse effects.
Grade II Listed Buildings at Orchard Farm		No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1030635	Orchard Cottage		
LB II 1377239	Orchard Farmhouse		
LB II 1198955	Oak Tree Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1283774	Chatburn Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II and II* Listed Buildings at Middleton Moor		Yes	Setting of assets is defined by relationship to agricultural land and nearby buildings. Any perceptual change would arise as a result of increased vehicle traffic along the B1122.
LB II 1030645	Thatched House		
LB II* 1199307	Moor Farmhouse		
LB II 1283443	The Cottage		
Conservation Area, Scheduled Monuments and Grade II and II* Listed Buildings at Dunwich		No	Setting of assets is defined by relationship to adjacent buildings, agricultural land and particularly to the sea. Built elements of proposed development may be visible in a

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			small number of minor views from close to the assets but as distant background features in filtered views in which the existing power stations are already visible. Any perceptual change will be insufficient to give rise to significant adverse effects.
Conservation Area	Dunwich		
SM 1005995	Hospital of the Holy Trinity (site of)		
SM 1006039	Grey Friars		
SM 1006032	Chapel of St James' Hospital		
LB II 1030712	Whitefriars		
LB II 1030713	Dunwich Museum		
LB II 1030714	Red House Flats		
LB II* 1030715	Remains of Grey Friars Monastery		
LB II 1198292	Church Farmhouse		
LB II 1198313	Old Town Hall		
LB II 1283876	The Ship Inn		
LB II 1283930	Church of St James		
LB II 1377200	Remains of All Saints Church 25 metres south of Church of St James		
LB II 1377201	Ivy Cottage Old Post Office Tinkers Cottage		
	Non-designated coastguard cottages, Dunwich Heath	Yes	Existing power station is prominently visible in views of cottages from the North; ground-level views of proposed development from the asset are well-screened, but views from upper storey may be clearer. Visibility of new development in views of or from the asset could give rise to harm.
LB II 1377227	Low Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1377246	Watermill Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II Listed Buildings at Fordley Hall		No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1199224	Fordley Hall		
LB II 1377244	Vale Farmhouse		
Grade II Listed Buildings at East Green		No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1030636	East Green Farmhouse		
LB II 1030637	Beech Tree Farmhouse		
LB II 1216049	High House Farm	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II and II* Listed Buildings at Friston		No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II* 1215741	Friston Post Mill		
LB II 1215744	Woodside Farmhouse		
LB II 1215751	Duffield House		
LB II 1215909	Friston Hall		
LB II 1216066	Friston House		
LB II* 1287864	Church of St Mary		
LB II 1287969	Gate and gate piers 15 metres north east of Friston Hall		
LB II 1287971	Numbers 1 and 2 (Church Walls), Number 3 and Number 4 (Church Walls Cottage)		
Conservation Area and Grade II and II* Listed Buildings at Darsham		No	Setting of assets is defined by relationship to adjacent buildings and agricultural land. Any perceptual change will be insufficient to give rise to significant adverse effects given the distance of the assets from the Park and Ride, intervening planting and the existing A12.
LB II 1030665	Tudor Cottage		
LB II 1030666	Church Cottage		
LB II* 1198761	Darsham House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB I 1198791	Church of All Saints		
LB II 1198806	Rose Cottage and Beech Cottage		
LB II 1377215	Lodge Cottage		
Grade II Listed Buildings at North Green		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1030639	Brightmere		
LB II 1377242	North Green Farmhouse		
LB II 1030687	Red House, Red House Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1198772	The Crooked House	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1030593	Beveriche Manor Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is screened from proposed road access route by high hedge to B1122 and shelter planting to asset. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1377216	Trustans Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1198815	Old Hall	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1200791	Rookery Cottages	Yes	Setting of assets is defined by relationship to agricultural land and nearby buildings. Any perceptual change would arise as a result of increased vehicle traffic along the B1122..
SM 1007682	Moated Site At Lymball's Farm	No	Setting of asset is defined by relationship to adjacent buildings and surrounding

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1030705	Hinton High Poplars Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1231296	Hill Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1231179	Wood Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1268178	Hurts Hall	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1287970	Cottage 20 Metres North Of Blackheath Mansion	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Conservation Area and Grade I, II and II* Listed Buildings at Aldeburgh		Yes	Existing power station is clearly visible in views north from northern part of Conservation Area and waterfront. Additional development could give rise to harm.
Conservation Area	Aldeburgh		
LB II 1247244	Number 3 and attached walls to north and east and south including garage		
LB II 1269690	Group of seven chest tombs approximately seven metres east of chancel of Church of St Peter and St Paul		
LB II 1269691	Group of three chest tombs approximately eleven metres south east of Church of St Peter and St Paul		
LB II 1269692	Lifeboat disaster monument approximately eighty five metres north east of the church of St Peter		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
	and St Paul		
LB II 1269693	Monument approximately three metres west of north vestry of Church of St Peter and St Paul		
LB II 1269694	Mill Inn		
LB II 1269695	Uplands Hotel		
LB II 1269696	North House		
LB II 1269697	Tiffany House		
LB II 1269698	Garden House fifty metres west of Tiffany House (Number Three)		
LB II 1269711	Red House		
LB II 1269712	8-14, Market Cross Place		
LB II 1269713	White Lion Hotel		
LB II 1269714	Market Cross House		
LB II 1269715	Moot House		
LB I 1269716	Moot Hall		
LB II 1269717	Oakley House		
LB II 1269718	Priors Hill		
LB II 1269719	Dolphin House		
LB II 1269720	Sandhill		
LB II 1269722	Water Tower		
LB II 1269723	Aldeburgh Hall		
LB II 1269725	1 and 3, Town Steps		
LB II 1269726	2-10, Town Steps		
LB II 1269727	Cherry Cottage		
LB II 1269728	Water Pump		
LB II 1269729	Wyndham House		
LB II 1269730	Church Farmhouse		
LB II* 1269731	Church of St Peter and St Paul		
LB II 1269732	Bell Cottage		
LB II 1269733	Dart Cottage		
LB II 1269734	Aldeburgh Pharmacy		
LB II 1269735	Old Cottage Tyne Cottage		
LB II 1269736	The Suffolk		
LB II 1269737	170 and 172, High Street		
LB II 1269738	Lewis House		
LB II 1269739	Numbers 213a and 215 incorporating Number 213		
LB II 1269740	Dutch Flat Gosfield Cottage The		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
	Nutshell		
LB II 1269741	White Hart Inn		
LB II 1269742	The Old Custom House		
LB II 1269743	Lavender Cottage Rosemary Cottage		
LB II 1269744	229 and 229a, High Street		
LB II 1269745	End Cottage The Sun Trap		
LB II 1269746	Cranstons		
LB II 1269749	259, High Street		
LB II 1269750	267,269,271, High Street		
LB II 1269751	Union Baptist Chapel including forecourt railings, gates and gate piers		
LB II 1269752	Half Crown Cottage		
LB II 1269764	Alde House		
LB II 1269765	Adair Lodge		
LB II 1269766	Thelluson Lodge		
LB II 1269767	Swiss Cottage		
LB II 1269768	Cross Keys Inn		
LB II 1269769	Ocean Strand		
LB II 1269770	Stafford House		
LB II 1269771	The North Lookout		
LB II 1269772	The South Lookout		
LB II 1269773	Crespigny House		
LB II 1269774	84, High Street		
LB II* 1269724/ SM 1006041	Slaughden Martello Tower	Yes	Consultee request from SCC Archaeology; visibility of proposed development will be severely restricted, but may affect the perceptual relationship of the Martello Tower and the town to the North.
SM 1006040	Church Common round barrows	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
Grade II and II* Listed Buildings at Sternfield and Benhall Green		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land, and in some cases the existing A12 major road. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1030866	The Limes		
LB II 1030905	Bay Tree Cottages		
LB II 1030906	7 and 8, Benhall Green		
LB II 1030907	Oak Cottage		
LB II 1030908	Benhall Cottage		
LB II 1187694	Benhall Stores		
LB II 1231182	Briar Cottage		
LB II 1231183	Brook Farmhouse		
LB II 1231300	Sternfield House		
LB II 1231328	Sandy Cottage		
LB II 1231355	Thatched Cottage		
LB II 1258312	Garden Cottage		
LB II 1278159	Sternfield Hall		
LB II 1278167	1 and 2, The Street		
LB II* 1278252	Church of St Mary Magdalene		
LB II 1278253	8-10, Church Hill		
LB II 1278254	Start Farm		
LB II 1278255	34 and 35, The Street		
LB II 1280112	31 and 33, Benhall Green		
LB II 1280113	Lime Tree House		
LB II 1377095	Whitehouse Farmhouse		
LB II 1377133	5 and 6, Benhall Green		
LB II 1377134	28, Benhall Green		
Conservation Area and Grade II and II* Listed Buildings at Saxmundham		No	The character of Saxmundham is one of an historic market town. The setting of assets is defined by relationship to adjacent buildings and agricultural land on the fringes of the settlement. Visibility of proposed development will be precluded by intervening topography, buildings and planting and asset group is located away from proposed road and rail access routes.
Conservation Area	Saxmundham		
LB II 1268158	Beech Lawn Cottage		
LB II 1268159	Beech Lawn House including orangery to rear		
LB II 1268160	Ivy House		
LB II 1268161	16, South Entrance		
LB II 1268162	Monks Cottages		
LB II 1268163	The White House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1268164	Crown House		
LB II 1268179	1-15, Albion Street		
LB II 1268180	10 and 12, Albion Street		
LB II 1268181	Chantry Cottages		
LB II 1268182	14 and 16, Chantry Road		
LB II 1268183	Church House		
LB II* 1268184	Church of St John Baptist		
LB II 1268185	Fairfield House East, Fairfield House South, Brook Farmhouse		
LB II 1268186	2, High Street		
LB II 1268187	6, 6a and 8, High Street		
LB II 1268188	10, High Street		
LB II 1268189	Holly Lodge		
LB II 1268190	White Hart Hotel		
LB II 1268191	23, High Street		
LB II 1268192	25 and 27, High Street		
LB II 1268193	26, 26a and 26b, High Street		
LB II 1268194	28 and 30, High Street		
LB II 1268195	Bell Hotel		
LB II 1268196	33, High Street		
LB II 1268197	35, High Street		
LB II 1268198	39, High Street		
LB II 1365982	46, High Street		
LB II 1365983	Ashford House		
LB II 1365984	Market Hall, front steps and attached railings		
LB II 1365985	Old Bank House including railings to front		
LB II 1365986	4 and 6, Market Place		
LB II 1365987	7 and 7a, Market Place		
LB II 1365988	8, Market Place		
LB II 1365989	16, Market Place		
LB II 1365990	Wingfield House		
LB II 1365991	9, 11, 15 and 19, Market Place		
LB II 1365992	17, Market Place		
LB II 1365993	21 and 23, Market Place		
LB II 1365994	Lynwood House		
LB II 1365995	Varley House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II* 1365996	The Beeches including Stable Block		
LB II 1365997	Fairfield Preparatory School		
LB II 1365998	24, North Entrance		
LB II 1365999	Brook Cottage		
LB II 1366000	Post Mill Roundhouse		
LB II 1366002	Priory House		
Grade I, II and II* Listed Buildings at Carlton and Kelsale	No		Setting of assets within these smaller settlements is defined by their relationship to adjacent buildings and agricultural land on the fringes. Visibility of proposed development will be precluded by topography, buildings and intervening planting and asset is located away from proposed road and rail access routes.
LB II 1030634	Thornlands		
LB II* 1030638	Kelsale Manor		
LB II 1030640	Kelsale Mill		
LB II 1030641	Kelsale Teachers Centre		
LB II* 1030668	Church of St Peter		
LB II 1030669	Park Farmhouse		
LB II* 1030671	Lych gate to Church of St Mary and St Peter		
LB II 1030672	Rosebank and Rosebank Cottage		
LB II 1030673	Robins Patch and Cherry Tree Cottage		
LB II 1198842	Manor House		
LB II 1198857	Carlton Cross		
LB II 1198922	Carlton Cottage		
LB II 1198998	Old Rectory Cottages		
LB I 1199020	Church of St Mary and St Peter		
LB II 1199192	Kelsale Social Club (including Corner Cottage)		
LB II 1246941	The Garden House		
LB II 1283568	Curlew Green Farmhouse		
LB II 1377218	Carlton Rookery		
LB II 1377219	The Eight Bells		
LB II 1377238	Brook Cottage		
LB II 1377240	Kelsale Court		
LB II 1377241	Tudor House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1377236	Rookery Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1183433	Bark Barn	No	Setting of asset is defined by relationship to adjacent buildings (i.e. Rookery Farmhouse) and agricultural land. Asset is screened from designated transport route by hedgerow and shelter planting. Any perceptual change will be insufficient to give rise to significant adverse effects.
Conservation Area and Grade II and II* Listed Buildings at Yoxford		Yes	Setting of assets is defined by relationship to adjacent buildings and agricultural land on the fringes of the settlement, and in some cases to the A12 major road. Visibility of proposed development will be precluded by intervening topography and planting. Any perceptual change would arise from increased traffic, through the village, particularly at the junction with the B1122, which may be sufficient to give rise to significant adverse effects on assets adjacent to the A12.
Conservation Area	Yoxford		
LB II 1030591	The Lodge		
LB II 1030592	The Old Vicarage		
LB II 1030594	Vine Cottage		
LB II 1030596	Methodist Chapel		
LB I 1030621	Cockfield Hall		
LB II 1030622	Dovecote Cockfield Hall		
LB II 1030623	Gateway 20 metres west north west of Cockfield Hall Gatehouse (including adjoining walling)		
LB II 1030625	The Limes		
LB II 1030626	Old School Cottages		
LB II 1030627	The Gables		
LB II 1030628	Old Bakery		
LB II 1030629	Signpost 20 metres north east of St Peters Church tower		
LB II 1030630	Milestone 10 metres south west of Yoxholme		
LB II 1030631	Minsmere House		
LB II 1030632	Hope House		
LB II 1030633	Pine Tree Cottages		
LB II 1200577	Coach House and Barn Cockfield Hall		
LB II 1200596	Walling to north and west of		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
	Cockfield Hall Gatehouse		
LB II 1200607	Gateway immediately north west of Coach House and Barn, Cockfield Hall (including adjoining walling)		
LB II 1200636	Satis House		
LB II 1200647	Cockfield Hall Lodge		
LB II 1200652	London House		
LB II* 1200659	Church of St Peter		
LB II 1200684	Wisbech Cottage		
LB II 1200712	Manor House (east side)		
LB II 1200771	Yoxholme		
LB II 1300631	Magnolia House		
LB II* 1300688	The Gatehouse Cockfield Hall		
LB II 1377235	Gateway immediately south east of Coach House and Barn, Cockfield Hall (including adjoining I shaped section of walling to south east)		
LB II 1377237	White Lodge and the White House		
LB II 1377257	Manor House (west side)		
LB II 1377274	Dairy range Cockfield Hall		
LB II 1030664	Oak Hall	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1377254	Hill Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1377233	Haw Wood Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
SM 1011381	Bowl Barrow West Of Fen Covert, 305m South Of Fen Cottage	No	Setting of assets is defined by relationship to adjacent buildings and agricultural land. Visibility of proposed development is precluded by heathland planting and asset is located away from proposed road and rail access routes
LB II 1030704	Hinton Hall	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			away from proposed road and rail access routes
LB II 1030680	Stone Cottage	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1377243	Laurel Farmhouse	No	Setting of assets is defined by relationship to A12 major road and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1198033	Church Of St Botolph	No	Setting of assets is defined by location adjacent to river within low-lying ground in the Iken Marshes. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes
LB II 1278152	Watering End	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and shelter planting; asset is located away from proposed road and rail access routes
LB II 1231290	Runton Croft	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
Conservation Area and Grade II Listed Buildings at Snape		No	Asset group is located approximately 9km from the proposed development with no visibility and is located away from any designated traffic routes.
Conservation Area	Snape		
LB II 1231175	Snape House		
LB II* 1231174	Church Of St John The Baptist		
LB II 1231173	The Crown Inn		
LB II 1231176	Smithy Cottage		
Grade II and II* Listed Buildings at Abbey Farm, Snape		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Asset group has no visibility of the proposed development and is located away from any designated traffic routes.
LB II 1231164	Abbey Farmhouse		
LB II* 1278251	Barn 60 Metres North West of Abbey Farmhouse		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1377226	Great Dingle Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening shelter and woodland planting; asset is located away from proposed road and rail access routes.
LB II 1377150	Snape Maltings	No	Setting of assets is defined by relationship to River Alde, adjacent buildings and surrounding agricultural land. Asset group has no visibility of the proposed development and is located away from any designated traffic routes.
LB II 1231293	Waterfields	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development will be precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1230212	Rose Hill House	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1298587	The Old House	No	Setting of assets is defined by relationship to adjacent buildings and A12 major road. Visibility of proposed development will be precluded by intervening planting and asset is located away from proposed road and rail access routes. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1051979	Old Vicarage	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
Grade II Listed Buildings at Benhall Lodge		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1030901	Benhall Lodge Stables		
LB II 1230208	Ducks Paddle Cottage		
LB II 1030682	Peacock Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			routes.
LB II 1377195	Piper's Farmhouse, Hinton	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening topography and planting; asset is located away from proposed road and rail access routes.
LB II 1198461	Windmill On Westwood Marshes	No	Setting of assets is defined by location in coastal marsh land. The existing Sizewell B station is visible as a distant element in some views from the vicinity of the asset. While the proposed development may be visible in some views, any perceptual change will be insufficient to give rise to significant adverse effects.
Grade II Listed Buildings at Westwood Lodge		No	Asset is well-screened by shelter planting and visibility of proposed development is restricted to some longer views from the marsh-edge to the south and east of the asset in which it will appear as a distant element. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1030707	Stables 10 metres west of Westwood Lodge		
LB II 1030708	Barn 60 metres north north-west of Westwood Lodge		
LB II 1377196	Westwood Lodge		
LB II 1377197	Barn 70 metres north west of Westwood Lodge		
LB II 1377221	The Round House, Blackheath	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening planting and asset is located away from proposed road and rail access routes.
Scheduled Monuments at Tinker's Walks		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by intervening planting and asset is located away from proposed road and rail access routes.
SM 1011385	Bowl barrow on Tinker's Walks, 740m west of Eastwoodlodge Farm		
SM 1011382	Bowl barrow on Tinker's Walks, 950m WSW of Eastwoodlodge Farm		
Conservation Areas and Grade I and II Listed Buildings at Walberswick		No	Setting of assets is defined by relationship to adjacent buildings and immediate surrounding land as well as its proximity to the River Blyth and the coast. Visibility to the

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			south from the assets is severely restricted and any perceptual change will be insufficient to give rise to significant adverse effects.
Conservation Area	Southwold Harbour and Walberswick Quay		
Conservation Area	Walberswick		
LB II 1030683	The Bell Hotel		
LB II 1030684	Valley Farmhouse		
LB II 1030685	Thorpe View		
LB II 1030686	The Mercers Hall		
LB II 1198477	Bell Cottage		
LB II 1198499	Barn 30 metres west of Thorpe View		
LB I 1283823	St Andrew's Church		
LB II 1377224	The Potter's Wheel		
LB II 1377225	The Old Corner House		
LB II 1384320	Harbour Inn		
Conservation Area and Grade I, II and II* Listed Buildings at Blythburgh		No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by planting, buildings and the underlying topography..
Conservation Area	Blythburgh		
LB II 1030709	Church Farmhouse		
LB I 1030710	Holy Trinity Church		
LB II 1030711	Forge Cottage (including railings and boundary walling to Priory Road)		
LB II 1198230	Hawthorn Farmhouse		
LB II 1198255	Remains of Augustinian Priory 60 metres north of The Priory		
LB II 1198264	White Cottage		
LB II 1283914	The Green		
LB II* 1377198	White Hart Inn		
LB II 1377199	The Priory		
LB II 1198227	Bulcamp House	No	Setting of assets is defined by relationship to adjacent agricultural land and tidal marshland. Visibility of proposed development is precluded by intervening topography and asset is located away from proposed road and rail access routes.
LB II 1032138	Blackshore Windpump	No	Setting of assets is defined by location within coastal marsh land. Visibility of proposed development at ground level is precluded by

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			underlying topography and planting at Walberswick.
Conservation Area and Grade I, II and II* Listed Buildings and non-designated assets at Southwold		Yes	Existing power station is clearly visible in longer views from the sea front and southern parts of the Conservation Area.
Conservation Area	Southwold		
LB II 1384310	Old Water Tower		
LB II 1380274	The Studio		
LB II 1384311	15 and 16, Barnaby Green		
LB II 1384312	17, Barnaby Green		
LB II 1384313	1 and 2, Bartholomew Green		
LB II 1384314	3 and 4, Bartholomew Green		
LB II 1384315	5 and 6, Bartholomew Green		
LB II 1384316	Iona		
LB II 1384317	Vanessa Villa		
LB II 1384318	Oak Cottage		
LB II 1384319	Churchyard gates approximately 15 metres south of Church of St Edmund's		
LB I 1384321	Church of St Edmund		
LB II 1384322	Chest tomb approximately 5 metres south east of Church of St Edmund		
LB II 1384323	Headstone to A Nolloth approximately 15 metres south of chancel of Church of St Edmund		
LB II 1384324	2 headstones approximately 12 metres south east of Church of St Edmund		
LB II 1384325	2 headstones approximately 15 metres east south east of Church of St Edmund		
LB II 1384326	Pair of headstones approximately 5 metres south of porch of Church of St Edmund		
LB II 1384327	Bardwell monument approximately 15 metres south of the chancel of Church of St Edmund		
LB II 1384328	Headstone approximately 10 metres south of porch of Church of St Edmund		
LB II 1384329	1-19, Church Street		
LB II 1384330	24 and 26, Church Street		
LB II 1384331	Headstone approximately 7 metres south of porch of Church of St Edmund		
LB II 1384332	Iona Cottage and Iona Flat		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1384333	Lydstep House and Coign		
LB II 1384334	Rowan Cottage		
LB II 1384335	Cliff House and Shrimp Cottage		
LB II 1384336	5 and 6, East Cliff		
LB II 1384337	7, East Cliff		
LB II 1384338	East Cliff Cottage		
LB II 1384339	Back to Front Cottage East Cliff House		
LB II 1384340	Bay View (Number 14) and East Cliff (Number 15) and railings attached to front		
LB II 1384341	Sailors' Reading Room		
LB II 1384342	3-6, East Green		
LB II 1384343	Sole Bay Inn		
LB II 1384344	8 and 9, East Green		
LB II 1384345	10, East Green		
LB II 1384346	2, East Street		
LB II 1384347	Gordon House		
LB II 1384348	Trafalgar Cottage		
LB II 1384349	Spindrift		
LB II 1384350	Reading Room Cottage		
LB II 1384351	Salt Works Cottage		
LB II 1384352	Park Lane Cottage Park Lane Cottage West		
LB II 1384353	Gun Hill Place		
LB II 1384354	Stone House		
LB II 1384355	Watch House		
LB II 1384356	Ferndale Cottage		
LB II 1384357	13 and 15, High Street		
LB II 1384358	Barnaby Cottage		
LB II 1384359	White Horse Cottage		
LB II 1384360	20, High Street		
LB II 1384361	22, High Street		
LB II 1384362	King's Head Hotel		
LB II 1384363	25, High Street		
LB II 1384364	Montague House and railings attached at front		
LB II 1384365	38 and 60, High Street		
LB II 1384366	The Old House (Number 49)		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1384367	54 and 54a, High Street		
LB II 1384368	55-63, High Street		
LB II* 1384369	Sutherland House		
LB II* 1384370	Manor House and Manor Gate including forecourt walls		
LB II 1384371	66, High Street		
LB II 1384372	Olde Banke House		
LB II 1384373	71, High Street		
LB II 1384374	Rutland House		
LB II* 1384375	Buckenham House		
LB II 1384376	82 , 84 and 86, High Street		
LB II 1384377	Crown Hotel		
LB II 1384378	94, High Street		
LB II 1384379	96, High Street		
LB II 1384380	98, 98a and 100, High Street		
LB II 1384381	United Reformed Church		
LB II 1384382	3, Market Place		
LB II 1384383	10, Market Place		
LB II 1384384	11 and 13, Market Place		
LB II 1384385	15, Market Place		
LB II* 1384386	Lloyds Bank		
LB II 1384387	19, Market Place		
LB II 1384388	21, Market Place		
LB II 1384389	23, Market Place		
LB II 1384390	25, Market Place (see details for further address information)		
LB II 1384391	Swan Hotel		
LB II 1384392	Town Hall		
LB II 1384393	Town Pump		
LB II 1384394	Rosemary Cottages		
LB II 1384395	The Old Chapel		
LB II 1384396	Primrose Cottage and Dolphin Cottage		
LB II 1384397	Bradwell House (Number 6)		
LB II 1384398	9, Park Lane		
LB II 1384399	10 and 12, Park Lane		
LB II 1384400	13 and 15, Park Lane		
LB II 1384401	14, Park Lane		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1384402	16 and 18, Park Lane		
LB II 1384403	Honeysuckle Cottage (Number 17)		
LB II 1384404	20, Park Lane		
LB II 1384405	21 and 23, Park Lane		
LB II 1384406	Strickland House		
LB II 1384407	Park Lane Cottage Park Lane Cottage West		
LB II 1384408	6, Pinkney's Lane		
LB II 1384409	The Elms (Number 1)		
LB II 1384410	4 and 6, Queen Street		
LB II 1384411	Evington		
LB II 1384412	Holmwood		
LB II 1384413	10, Queen Street		
LB II 1384414	12, Queen Street		
LB II 1384415	14, Queen Street		
LB II 1384416	16, Queen Street		
LB II 1384417	18, Queen Street		
LB II 1384418	Coachman's Cottage		
LB II 1384419	6, Queen's Road		
LB II 1384420	8, Queen's Road		
LB II 1384421	The Bolt Hole and Wayside Cottage		
LB II 1384422	Whitehall and Guardship		
LB II 1384423	Greyfriars North and Greyfriars South and Regency House		
LB II 1384424	Red Lion Inn		
LB II 1384425	Sole Bay Cottage		
LB II 1384426	South Green Cottage		
LB II 1384427	7, South Green		
LB II 1384428	South Green House		
LB II 1384429	10a, 10b, 10c and 10d, South Green		
LB II 1384430	Dartmouth Cottage		
LB II 1384431	South House		
LB II 1384432	Wellesley Cottage		
LB II 1384433	14 and 14a, South Green		
LB II 1384434	Providence Cottage		
LB II 1384435	The Retreat and Pin Cottage		
LB II 1384436	24, South Green		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1384437	Tudor Cottage		
LB II 1384438	Hill House and Woldside		
LB II 1384439	Adnams Wine Merchants		
LB II 1384440	Cannon Lodge		
LB II 1384441	Centre Cliff		
LB II 1384442	Centre Cliff		
LB II 1384443	May Place May Place Cottage (Number 7a)		
LB II 1384444	The Lighthouse		
LB II 1384445	8, Trinity Street		
LB II 1384446	10, Trinity Street		
LB II 1384447	Trinity Cottage		
LB II 1384448	Lantern Cottage (Number 52)		
LB II 1384449	75 and 77, Victoria Street		
LB II 1384450	Southwold Museum		
LB II 1384451	Church of the Sacred Heart and attached Presbytery		
	Southwold Pier		
SM 1014860	Orford Castle with adjoining quarry and remains of 20th century look- out post	Yes	Consultee request from SCC Archaeology and Historic England; views from the castle contribute to its setting.
Conservation Area and Grade I and II Listed Buildings at Orford		No	Views to the SZC site from the Conservation Area at ground level are precluded by the underlying topography.
Conservation Area	Orford		
LB II 1030846	K6 Telephone Kiosk		
LB II 1030868	Chantry Farmhouse		
LB II 1030869	76, Broad Street		
LB II 1030870	The Old Friary		
LB II 1030871	Broadview Gwelfor		
LB II 1030872	117, Castle Hill (see details for further address information)		
LB I 1030873	Orford Castle		
LB II 1030874	The Great House		
LB II 1030875	50, 51, 53 and 54, Church Street		
LB II 1030876	Castle Cottage		
LB II 1030877	Daphne House		
LB II 1030878	Crown and Castle Hotel		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1030879	21, 23 and 24, High Street		
LB II 1030880	Martley		
LB II 1030881	The Post Office		
LB II 1030882	Dolphin House		
LB II 1030883	87 and 88, Pump Street		
LB II 1030884	Bell House Conniston Lismore		
LB II 1030885	Rose Cottage		
LB II 1030886	Saham Cottage		
LB II 1198326	The Chestnuts		
LB II 1198347	112-115, Church Street		
LB II 1198352	High House High House Cottage		
LB II 1198355	Kings Head Public House		
LB II 1198367	20, High Street		
LB II 1198392	Town Hall		
LB II 1198406	Castle Antiques		
LB II 1198417	84 and 83, Market Hill		
LB II 1198444	Corner House		
LB II 1198469	66 and 67, Quay Street		
LB II 1198481	The Jolly Sailor Public House		
LB II 1283838	The Cottage		
LB II 1283854	64 and 65, Quay Street		
LB II 1283857	Manor House		
LB II 1283880	55 and 57, Church Street		
LB II 1283881	37-47, Daphne Road		
LB II 1283893	Hill House		
LB II 1372425	The Hollies		
LB II 1377117	111, Church Street		
LB II 1377118	58, Church Street		
LB I 1377119	St Bartholomews Church		
LB II 1377120	Number 29 Smithy Tea Rooms and Number 28		
LB II 1377121	Butley Orford Oysterage		
LB II 1377122	Unicorns		
LB II 1377123	Water Pump		
LB II 1377124	Old Brewery House		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
Scheduled and Grade II listed lighthouse and former military structures at Orford Ness		Yes	Consultee request from SCC Archaeology and Historic England; the existing Sizewell A and B stations are visible as elements of a 20 th -century landscape associated with the nuclear age. Clear, though distant views to the proposed development could give rise to change in the setting of these assets
LB II 1392631	Orfordness Lighthouse		
LB II 1416866	Orford Ness: former Royal Flying Corps barrack block		
LB II 1416867	Orford Ness: former RFC Officers' Mess and AWRE canteen building		
LB II 1416868	Orford Ness: the Black Beacon and associated power house		
LB II 1416869	Orford Ness: Bomb Ballistics building		
SM 1416933	Orford Ness: the Atomic Weapons Research Establishment test buildings and associated structures		
Listed Buildings at Stratford St Andrew and Farnham		Yes	Some assets may be subject to direct and/or indirect adverse effects as a result of new road configuration.
LB II 1230210	Farnham Manor		
LB II* 1230211	Church of St Mary		
LB II 1230213	Elm Tree Farmhouse		
LB II 1230214	Elm Tree Cottage		
LB II 1230215	Post Office Stores		
LB II 1230216	George and Dragon		
LB II 1230217	Turret Cottage, Turret House		
LB II* 1231407	Church of St Andrew		
LB II 1278123	4 Cottages 30 metres South of St Andrew's Church		
LB II 1377115	Benhallstock Cottages	No	Setting of assets is defined by relationship to A12 major road and surrounding agricultural land. Assets are well-screened from designated transport routes and any increase in traffic would be insufficient to give rise to significant adverse effects.
Listed Buildings at Benhall Place			Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Assets are well-screened from the A12 and any increase in traffic would be insufficient to give rise to significant adverse effects.

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1030910	Benhall Place Cottages		
LB II 1206712	Benhall Place Cottages		
LB II 1280086	Benhall Place		
LB II 1206693	Stables immediately north east of barn at Benhall Place		
LB II 1030909	Barn 60 metres west of Benhall Place		
LB II 1377096	Stone Cottages		
Listed Buildings at Marlesford Main Road		No	Setting of assets is defined by relationship to A12 major road adjacent buildings, and surrounding agricultural land. Any perceptual change will be insufficient to give rise to significant adverse effects.
LB II 1231067	9 and 10, Main Road		
LB II 1231068	Bridge House		
LB II 1231069	Bell Inn		
LB II 1278281	Old Post Office		
Conservation Area and Listed Buildings at Marlesford		No	Setting of assets is defined by relationship to adjacent buildings and location in village. Visibility of proposed development will be precluded by topography and intervening planting; asset is located away from proposed road and rail access routes. Any perceptual change will be insufficient to give rise to significant adverse effects.
	Marlesford Conservation Area		
LB I 1278312	Church of St Andrew		
LB II 1231066	Holly Cottages		
LB II 1278409	The Rectory		
LB II 1231065	Shadyside		
LB II 1230837	26 and 27, Low Road		
LB II 1231063	April Cottage		
LB II 1278410	Poplar Farmhouse		
LB II 1230836	17-19, Low Road		
Listed Buildings at All Saints, Hacheston		No	Setting of assets is defined by inter-relationship of assets and relationship with surrounding agricultural land and village centre to the north of the church. Any views to the proposed park and ride would be filtered by existing hedgerow planting and perceptual change will be insufficient to give rise to significant adverse effects.
LB I 1199742	Church of All Saints		

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
LB II 1377285	Church Cottage		
LB II 1392095	Mausoleum 25m North of Church of All Saints		
Listed Buildings at Lower Hacheston		No	Assets are well screened from proposed park and ride by underlying topography, shelter planting and screening planting to A12 junction with B1078. Assets are close to A12, and are not on designated transport route. The proposed park and ride would not be visible in views of or from the assets and changes to traffic levels on the A12 would not give rise to any discernible change to setting.
LB II 1377280	Ash Cottage		
LB II 1199354	36, Ash Road		
Conservation Area and Listed Buildings at Wickham Market		No	Visibility of proposed park and ride precluded by underlying topography and dense planting around fringes of settlement. Asset group is located away from designated transport routes.
	Wickham Market Conservation Area		
LB II 1198652	The Crooked House		
LB II 1198662	181, High Street		
LB II 1377140	The Chequers Inn		
LB II 1377143	177-179, High Street		
LB II 1030843	183 and 187, High Street		
LB II 1283798	Deben Lodge		
LB II 1198671	201 and 203, High Street		
LB II 1030839	Bridge 20 metres South of Wickham Mill (including attached railings)		
LB II* 1198526	Wickham Mill		
LB II 1199653	Bridge 20 metres South of Wickham Mill (including attached railings)		
LB II 1377282	Former steam mill 20 metres South East of Wickham Mill		
LB II 1030838	240, High Street		
LB II 1030557	Bridge Farmhouse		
LB II 1030559	The Rookery	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1230208	Ducks Paddle Cottage	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed

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ASSET/GROUP	DESCRIPTION	IN EIA SCOPE?	RATIONALE
			development is by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1230328	Walnut Tree Farmhouse	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1231405	The Stud House	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1231406	Stratford Hall	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1278703	Home Farmhouse	No	Setting of assets is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development is precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
LB II 1278706	Barn Cottages	No	Setting of asset is defined by relationship to adjacent buildings and surrounding agricultural land. Visibility of proposed development will be precluded by topography and intervening planting; asset is located away from proposed road and rail access routes.
RPG II 1001461	Glemham Hall	No	Setting of asset is defined by surrounding agricultural landscape and the existing A12 forms a hard perceptual boundary to the asset. Visibility of proposed development will be precluded by intervening planting. Increased traffic movements on the A12 may give rise to some minor change but this will be insufficient to give rise to significant adverse effects.

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VOLUME 1, CHAPTER 6, APPENDIX 6M: SOILS AND AGRICULTURE LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

Annex

Annex 6M.1 Landowner interview proforma.

1. Soils and Agriculture Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of the likely significant effects on soils and agriculture from the construction, operation and removal and reinstatement (where applicable) of the Sizewell C Project.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant soils and agriculture effects of the Sizewell C Project relating to soils and agriculture, as described in the following **Environmental Statement (ES)** (Doc Ref. Book 6) chapters:

- **Volume 2, Chapter 17;** and
- **Volumes 3 to 9, Chapter 10.**

1.1.3 Any site-specific additions to the methodology are described within those volumes.

1.1.4 The assessments of potential effects on soils from other impacts, for example, contamination; and the potential effects of soils on other receptors, for example, as a result of silt laden run-off, are reported in the Geology and Land Quality **ES** chapters:

- **Volume 2, Chapter 18;** and
- **Volumes 3 to 9, Chapter 11.**

1.1.5 The assessment of potential impacts on groundwater and surface water has been undertaken with reference to the Groundwater and Surface Water **ES** chapters:

- **Volume 2, Chapter 19;** and
- **Volumes 3 to 9, Chapter 12.**

1.1.6 The assessment of potential impacts from invasive or weed species has been undertaken with reference to the Terrestrial Ecology and Ornithology **ES** chapters:

- **Volume 2, Chapter 14;** and
- **Volumes 3 to 9, Chapter 7.**

1.1.7 The assessment of potential impacts resulting from noise and vibration impacts has been undertaken with reference to the Noise and Vibration **ES** chapters:

- **Volume 2, Chapter 11;** and
- **Volumes 3 to 9, Chapter 4.**

1.1.8 The assessment of potential impacts on air quality has been undertaken with reference to the Air Quality **ES** chapters:

- **Volume 2, Chapter 12;** and
- **Volumes 3 to 9, Chapter 5.**

1.1.9 The assessment of potential impacts resulting from socio-economic impacts has been undertaken with reference to the Socio-economics **ES** chapters:

- **Volume 2, Chapter 9.**

1.2 [Legislation, policy and guidance](#)

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant soils and agriculture effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the soils and agriculture assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

[a\) International](#)

1.2.3 There is no international legislation or policy deemed relevant to the assessment of soils and agriculture.

[b\) National](#)

[i. Legislation](#)

1.2.4 Apart from the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (Ref. 1.1), there are no legislative requirements governing the assessment of impacts on agriculture and soils.

ii. Policy

National Policy Statements

- 1.2.5** The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.2) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.3). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.6** The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.7** A summary of the relevant NPS EN-1 and NPS EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1 4.2.1	The Directive [European Environmental Impact Assessment Directive] specifically refers to effects on human beings, fauna and flora, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them. The Directive requires an assessment of the likely significant effects of the proposed project on the environment, covering the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects at all stages of the project, and also of the measures envisaged for avoiding or mitigating significant adverse effects.	The approach to the assessment of likely significant effects on soils is set out in this appendix. Details of the likely significant effects on soils are set out in in relevant soils and agricultural chapters in Volumes 2 to 9 of this ES .
EN-1 5.10.8	Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification [ALC]) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other	A full assessment of the potential effects of the Sizewell C Project on best and most versatile land have been set out in in relevant soils and agricultural chapters in

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.	Volumes 2 to 9 of this ES .
EN-6 3.8.3	Applicants should assess the site's geology, soils and geomorphological processes in order to understand the ongoing natural ecological, coastal and geomorphic processes. This will include identifying impacts on coastal processes, intertidal deposition and soil development processes that maintain terrestrial/coastal and/or marine habitats.	Potential effects on soils and the interrelationship with ecological processes have been addressed in relevant soils and agricultural chapters in Volumes 2 to 9 of this ES .

National Planning Policy Framework 2019

- 1.2.8** The National Planning Policy Framework (NPPF) (Ref. 1.4) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).
- 1.2.9** Section 15 of the NPPF deals with conserving and enhancing the natural environment. This includes a requirement that planning policies and decisions should recognise *"the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland."*
- 1.2.10** A footnote to this adds that *"Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality."*

iii. Strategies

Planning Practice Guidance

- 1.2.11** Agricultural land is dealt with under the topic of the Natural Environment within the Planning Practice Guidance (Ref. 1.5). The ALC system is described and the requirement for a local planning authority to consult with Natural England before granting planning permission for large-scale non-

agricultural development on best and most versatile (BMV) land that is not in accord with the development plan is highlighted.

Government's 25 Year Environment Plan

- 1.2.12 The 25 Year Environment Plan (Ref. 1.6) published in 2018 sets out Government action to help the natural world regain and retain good health. It includes proposals to tackle the growing problem of soil degradation – an issue that affects urban areas as well as the countryside.
- 1.2.13 The Plan is designed to help boost productivity by enhancing our natural capital – the air, water, soil and ecosystems that support all forms of life, since this is an essential basis for economic growth and productivity over the long term.
- 1.2.14 Under the theme of using and managing land sustainably, there is an ambition to improve soil health, including developing better information on this subject.
- 1.2.15 Under the theme of using resources from nature more sustainably and efficiently, there is an aim to improve the approach to soil management. It is stated that by 2030 all of England's soils should be managed sustainably, with natural capital thinking used to develop appropriate soil metrics and management approaches.

A Strategy for England; Safeguarding Our Soils

- 1.2.16 A Strategy for England; Safeguarding Our Soils (Ref. 1.7) was published in 2009. This sets out the Government's aims in relation to protecting agricultural soils in England and in relation to protecting the soil resource during construction and development. This includes a requirement that planning decisions take sufficient account of soil quality, particularly where substantial areas of BMV agricultural land are involved.
- 1.2.17 Accordingly, whilst the presence of BMV agricultural land is a material consideration in taking planning decisions, this is one of a number of matters that should be taken into account, including other sustainability considerations such as: biodiversity, the quality and character of the landscape, accessibility to infrastructure, workforce and markets and maintaining viable communities.

c) Regional

- 1.2.18 There is no regional legislation or policy deemed relevant to the soils and agriculture assessment.

d) Local

i. Policy

Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies

- 1.2.19 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.
- 1.2.20 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.
- 1.2.21 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).
- 1.2.22 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

The Suffolk Coastal District Council Final Draft Local Plan

- 1.2.23 The presence of high quality agricultural land is highlighted as a key issue in the Draft Local Plan (Ref. 1.8). Policy Suffolk Coastal Local Plan 10.3: Environmental Quality states that development proposals will be considered in relation to their impacts on soils and agricultural land.
- 1.2.24 Policy Suffolk Coastal Local Plan 3.4 requires that measures to ensure the successful decommissioning and restoration of the site through appropriate landscaping are delivered to minimise and mitigate the environmental and social harm caused during operational stages of projects.

e) Guidance

- 1.2.25 The soils and agriculture assessment has been undertaken in accordance with the following guidance documents:

- Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3, Part 11, LA109 Geology and Soils (Ref. 1.9);
- Natural England Technical Information Note 049 (2012) (Ref. 1.10) – this provides the background to the importance of agricultural land, the ALC system, the availability of information and field surveys;
- Defra Construction Code of Practice for the sustainable re-use of soils on construction sites (Ref. 1.11) – this sets out the best practice approaches to stripping, transporting, stockpiling and reinstating soils;
- Good Practice Guide for Handling Soils (Ministry of Agriculture, Fisheries and Food (MAFF), 2000) (Ref. 1.12) – this series sets out detailed approaches to soil stripping, stockpiling and reinstatement using different types of machinery; and
- British Standard Specification for Topsoil and Requirements for Use (BS3882:2015) (Ref. 1.13) – this provides a standard for natural and manufactured topsoil materials that are moved or traded (but does not apply to topsoil remaining *in situ* or re-used on site.

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6**.
- 1.3.2 This section provides a summary of the soils and agriculture assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific additions to the methodology are described within the relevant chapter of **Volumes 2 to 9**.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

- 1.3.5 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co.'s responses are detailed in **Table 1.2**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the soils and agriculture assessment.

Consultee	Date	Summary Of Discussion/Comments
Natural England	14 September 2016 (letter response).	Natural England were consulted in relation to existing ALC information and how this would be used and built on to inform the assessment. It was agreed that the previous surveys identified could be used to inform the assessment and that the proposal to undertake detailed ALC surveys (in accordance with the published guidelines) in areas where there was no existing data was accepted.

c) Study area

- 1.3.6 The study area comprises the land within the site boundary. Where an individual land holding includes land outside the boundary this has been taken into account when assessing the potential impact on farm viability. Where land use adjacent to the site boundary includes livestock, this will be taken into account (in relation to potential impacts from noise).
- 1.3.7 The specific study areas for the main development site and the associated development sites are described within the methodology sub-section of the soils and agriculture chapters of the relevant volumes, see **Volumes 2 to 9** of the **ES**.

d) Assessment scenarios

- 1.3.8 The assessment of effects on soils and agriculture includes the assessment of the entire construction, operation and removal and reinstatement (where applicable) phases of the Sizewell C Project, rather than specific assessment years.

e) Assessment criteria

- 1.3.9 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any

resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.10 A summary of the assessment criteria used in the soils and agriculture assessment is presented in the following sub-sections.

i. Sensitivity

1.3.11 The criteria used in the soils and agriculture assessment for determining the sensitivity of receptors are set out in **Table 1.3**.

Table 1.3: Assessment of the value or sensitivity of receptors for soils and agriculture.

Value And/Or Sensitivity	Description
High	Grade 1, 2 and 3a land (i.e. best and most versatile (BMV) land); Irrigated agriculture; Stock animals; Higher level agri-environment schemes; Soils with low or no wetness limitation affecting workability (wetness class I or II), where drought is not also a limitation; and Soils with a high susceptibility to structural damage and soil erosion throughout the year, including heavily textured, poorly structured soils.
Medium	Grade 3b land; Non irrigated agriculture; Entry level agri-environment schemes; Soils with low wetness limitation affecting workability (wetness class II), where drought is not also a limitation; and Soils with some seasonal susceptibility to structural damage and soil erosion.
Low	Grade 4 land; Arable or grassland areas; Soils with moderate wetness limitation affecting workability (wetness class III or IV); and Soils with medium to coarse textures and some resistance to structural damage for most of the year.
Very Low.	Grade 5 land; Soils with high wetness limitation affecting workability (wetness class V or VI); Soils in which susceptibility to drought is a limitation to crop growth; and Course textured and stony soils with little potential for structural damage.

ii. Magnitude

1.3.12 The criteria used to assess the magnitude of impact are shown in **Table 1.4.**

Table 1.4: Assessment of magnitude of impact on soils and agriculture.

Magnitude	Criteria
High	<p>Permanent or long-term loss or degradation of over 50ha of BMV land, or entire regional resource of BMV land (ALC Grades 1, 2, 3a).</p> <p>Loss of >20% of farmed land associated with an agricultural farm holding.</p> <p>Permanent loss of entire area of land under agri-environment or Woodland Grant scheme.</p> <p>No access possible to severed land.</p> <p>Existing land-use across the land holding would not be able to continue.</p>
Medium	<p>Permanent or long-term loss or degradation of 20-50ha of BMV land, or large proportion of regional resource of BMV land.</p> <p>Loss of >10- 20% of farmed land associated with an agricultural farm holding.</p> <p>Long-term, reversible, loss of entire area or majority of land under agri-environment or Woodland Grant scheme.</p> <p>Access possible to severed land via the public highway.</p> <p>Existing land-use across the land holding would be able to continue but with major changes such as loss of yield, additional land management or increased use of fertilisers and herbicides.</p>
Low	<p>Permanent or long-term loss or degradation of 10-20ha of BMV land, or small proportion of regional resource of BMV land.</p> <p>Loss of >5-10% of farmed land associated with an agricultural farm holding.</p> <p>Short- to medium-term reversible loss, or permanent loss of small areas, of land area under agri-environment or Woodland Grant scheme.</p> <p>Access possible to severed land via private ways.</p> <p>Existing land-use across the land holding would be able to continue but with some changes such as loss of yield, additional land management or increased use of fertilisers and herbicides.</p>
Very Low.	<p>Permanent or long-term loss or degradation of <10ha of BMV land.</p> <p>Loss of <5% of farmed land associated with an agricultural farm holding.</p> <p>No severance.</p> <p>Short-term impacts to receptors with no impact on integrity. No material changes to existing land-use.</p>

- 1.3.13 For the purposes of this assessment long-term is considered to include the timeframe of the construction phase of the permanent elements of the Sizewell C Project and the construction, operation and removal and reinstatement of the temporary elements of the Sizewell C Project.

iii. Effect definitions

- 1.3.14 The definitions of effect for soils and agriculture are shown in **Table 1.5**.

Table 1.5: Classification of effects.

		Value / Sensitivity of receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

- 1.3.15 Following the classification of an effect as presented in **Table 1.5**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

f) Assessment methodology

i. Establishing the baseline

Existing baseline

- 1.3.16 Agricultural resources are characterised by the quality of the agricultural land and items of fixed farm and farm-related capital, as well as other items of capital associated with diversified activities on farms.

- 1.3.17 A range of existing information sources have been reviewed in order to assess the character of the site in terms of land use and soils, including:

- aerial photographs;
- published geological maps;
- published soil maps;
- National Soil Resources Institute Soil Site Reports; and

- published ALC maps (both provisional and detailed) and associated survey data/reports.

- 1.3.18 Where there is no existing detailed ALC mapping, soil and ALC surveys have been undertaken in accordance, where possible, with published guidelines (MAFF 1988) (Ref. 1.14). Full details of survey density, including any access restrictions, are set out in each chapter of the relevant volumes, see **Volumes 2 to 9** of the **ES**.
- 1.3.19 At each sampling location, soil physical characteristics were recorded with factors such as soil texture, structure, depth and stoniness assessed in terms of any limitation they pose to agricultural productivity. Site characteristics, such as micro-relief and flood risk, and climate, were also assessed in terms of potential limitations they may pose.
- 1.3.20 Where land is not under agricultural production and soil information was required to inform the development of an Outline Soil Management Plan, a similar survey process was followed but at a lower survey density. Details of these surveys, where applicable, are presented in each chapter of the relevant volumes, see **Volumes 2 to 9** of the **ES**.
- 1.3.21 Interviews were conducted with the tenant and/or landowner to understand the nature of the agricultural operations and historical and current use of the land. The question pro-forma used in the interviews is presented in **Annex 6M.1** of this chapter.
- 1.3.22 Details of the specific dates of each interview are presented as an appendix to the relevant chapter of **Volumes 2 to 9** of the **ES**.

Future baseline

- 1.3.23 It is considered unlikely that the land grade will change with time as this is principally determined by soil physical characteristics and broad climate aspects. However, it is recognised that climate change will affect soils (potentially as a result of increased droughtiness, increased rates of carbon decomposition, increased erosion risk) and this will be assessed over the timeframe of the construction phase (after which land required temporarily will be returned to agriculture).
- 1.3.24 The agricultural use of land may change with time. The landowner interviews have been used to gather information on potential changes, such as new or updated fixed farm assets or farm diversification. This would consider potential changes during the construction, operational and removal and reinstatement phases of the proposed development, as appropriate.

- 1.3.25 In addition, a review of committed developments has been undertaken. The presence of any such developments has been taken into account when assessing the potential effects. Further details are provided in the relevant chapters of **Volumes 2 to 9** of the **ES**.

ii. Construction, Operation and Removal and Reinstatement

- 1.3.26 The assessment of effects on soils and agriculture is based on the full construction, operation and removal and reinstatement periods (where relevant) and their associated activities rather than specific assessment years.

- 1.3.27 During the construction and removal and reinstatement periods significant earthworks activities will be undertaken (either stripping and stockpiling soils or reinstating soils where land has only been required temporarily). The potential for these works to impact on the soil resource and on agricultural operations have been considered in relation to the assessment criteria set out in **Tables 1.3 to 1.5** above. The assessment is undertaken based on the assumption that the primary and tertiary mitigation set out in each relevant chapter of **Volumes 2 to 9** of the **ES** is in place.

iii. Inter-relationships

- 1.3.28 Inter-relationships with the Geology and Land Quality chapters have been considered in relation to the potential risks of soils becoming contaminated and the potential risks of soils causing impacts to other receptors (for example as a result of silt-laden run-off).
- 1.3.29 Interrelationships in relation to the Landscape and Visual have been considered in relation to the requirement for soil condition to be suitable for the establishment and growth of the planting required.
- 1.3.30 Inter-relationships with the Noise and Vibration chapters have been considered in relation to the potential effects additional noise poses to livestock.
- 1.3.31 Interrelationships in relation to the Air Quality have been considered in relation to the potential effects from dust.
- 1.3.32 Inter-relationships with the Terrestrial Ecology and Ornithology chapters have been considered in relation to the potential risks posed by the presence of invasive and weed species.
- 1.3.33 Interrelationships with the Socio-economics chapters have been considered in relation the overall impacts on the agricultural sector and economy.

g) Assumptions and limitations

- 1.3.34 Where the ALC survey (auger) density is less than that required for detailed surveys or ALC surveys have not been undertaken this is identified in each chapter of the relevant volumes, see **Volumes 2 to 9** of the **ES**, and an assessment provided of the significance of this limitation.
- 1.3.35 Information on land use is based on information publicly available and as provided by landowners at the time of the assessment. Where it has not been possible to interview the landowner the assessment is based only on publicly available information (for example from historical aerial photographs). The implications for the assessment where this is the case is set out in each chapter of the relevant volumes, see **Volumes 2 to 9** of the **ES**.

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VOLUME 1, CHAPTER 6, APPENDIX 6M, ANNEX 6M.1:
LANDOWNER INTERVIEW PROFORMA

APPENDIX 6M: SOILS AND AGRICULTURE METHODOLOGY

Annex 6M.1 Landowner interview proforma

JANUARY 2020



FARM IMPACT ASSESSMENT

FARM HOLDING:

DATE & TIME OF INTERVIEW:

NAME OF OCCUPIER:

FARM SIZE	
FARM LOCATION (ring fenced, dissipated, already severed etc)	
Tenure	
Cropping / Stocking	
Labour Employed (Full-Time, Part-Time, Seasonal, Contractors)	
Farm Buildings & Locations	

Main internal farm access routes & tracks	
Land Drainage	
Field Water Supplies	
SFP Registration	
Land in Agri. Enviro Schemes (ESA / Countryside Management Scheme)	
Grant Funded Woodland Planting (FWGS & FWPS)	
Organic	
Any sensitive enterprises nearby (poultry etc)	
Shooting / Fishing	

Farm Diversification	
Need for accommodation works	
SUMMARY OF IMPACTS	

Arcadis (UK) Limited

Level 1
2 Glass Wharf
Temple Quay
Bristol
BS2 0FR
T: +44 (0)117 372 1200

[arcadis.com](https://www.arcadis.com)

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the width of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, intersecting the horizontal line.



VOLUME 1, CHAPTER 6, APPENDIX 6N: GEOLOGY AND LAND
QUALITY LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

Annexes

Annex 6N.1: Definition of Probability and Consequence

1. Geology and Land Quality Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects on geology and land quality from the Sizewell C Project. This appendix applies to the geology and land quality chapters for all Sizewell C Project sites, unless otherwise indicated, in the topic chapters of the site assessment, **Volumes 2 to 9** of the **Environmental Statement (ES)**. Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project relating to geology and land quality, as described in the following **ES** chapters:

- **Volume 2, Chapter 18;** and
- **Volumes 3 to 9, Chapter 11.**

1.1.3 The assessment of contamination on human health, property, ecological, groundwater and surface water receptors has been based on the Conceptual Site Models (CSM) included within the topic chapters identified above.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant land quality and geology effects associated with the proposed development.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following sections set out those elements of legislation and policy considered to be relevant to the land quality and geology assessment because they have influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. Water Framework Directive 2000/60/EC

1.2.3 The Water Framework Directive (WFD) 2000 (Ref. 1.1) establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. It requires:

- environmental objectives be set to ensure that good status of groundwater is achieved and that its deterioration is avoided. This includes that any upward sustaining trend in the concentration of a pollutant must be identified and reversed;
- early action and stable long-term planning of protective measures to ensure a good status of groundwater, owing to the natural time lag in its formation and renewal; and
- monitoring programmes to cover monitoring of the chemical and quantitative status of groundwater.

1.2.4 The WFD is transposed into the UK law by Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 1.2). A standalone WFD Compliance Assessment of the Sizewell C Project has been prepared and submitted as part of the Development Consent Order (DCO) application (Doc Ref. 8.4). This assessment provides more detailed explanation of the WFD.

ii. Waste Framework Directive 2008

1.2.5 Waste Framework Directive 2008 (Ref. 1.3) is a European Union (EU) Directive which sets the foundations for waste management across the EU and aims to promote the minimising or recycling of waste. The directive establishes the preferred hierarchy of waste management options which are in order of preference; prevention, reuse, recycle, recovery and disposal.

b) National

i. Legislation

Environmental Protection Act 1990

1.2.6 Part IIA of the Environmental Protection Act 1990 (Ref. 1.4) introduced a statutory regime for the identification and remediation of 'Contaminated Land'. It introduced, for the first time in the UK, a statutory definition of

‘Contaminated Land’ based on significant harm or the likelihood of significant harm (including risks to human health) or the pollution or likely pollution of controlled waters (all groundwater, inland waters and estuaries, excluding water perched above the zone of saturation).

1.2.7 Local authorities are the primary regulators under the Part IIA regime, with a duty to identify whether the land in their area is ‘Contaminated Land’, although provision is made for consultation and co-ordination with the Environment Agency in situations when pollution of controlled waters is an issue.

1.2.8 The principal objectives of the legislation are described in the Department for Environment, Food and Rural Affairs (Defra) Contaminated Land Statutory Guidance 2012 (Ref. 1.5), as follows:

- to identify and remove unacceptable risks to human health and the environment;
- to seek to ensure that contaminated land is made suitable for its current use; and
- to ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

1.2.9 These three objectives underlie the suitable for use approach to the assessment and remediation of land contamination. This approach recognises that the risks presented by any given level of land contamination can vary greatly according to the use of the land and a wide range of other factors, such as the sensitivity of the underlying geology and the receptors which may be affected. The suitable for use approach consists of three elements:

- ensuring that land is suitable for its current use;
- ensuring that land is made suitable for any new use; and
- limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land.

1.2.10 This approach has been followed within the geology and land quality assessment presented within this **ES**.

Water Resources Act 1991

- 1.2.11 The Water Resources Act 1991 (Ref. 1.6), regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters. Compliance with the Water Resources Act forms part of the tertiary mitigation for the purposes of the **ES**.

The Control of Substances Hazardous to Human Health Regulations 2002

- 1.2.12 Under the Control of Substances Hazardous to Human Health (COSHH) Regulations 2002 (Ref. 1.7), employers are required to protect employees and other persons (such as site visitors) from potential exposure to hazardous substances used at work. This is to be achieved by undertaking a risk assessment to identify potential risks and then to prevent those risks, or, if this is not reasonably practicable, to adequately control such exposures. Compliance with the COSHH Regulations forms part of the tertiary mitigation for the purposes of the **ES**.

Construction (Design and Management) Regulations 2015

- 1.2.13 The Construction (Design and Management) Regulations 2015 (CDM Regulations) (Ref. 1.8) define specific legal duties with the aim of protecting the health, safety and welfare of all persons involved with construction works. The regulations provide a broad definition of construction works which includes earthworks, groundworks and other enabling works. Compliance with the CDM Regulations forms part of the tertiary mitigation for the purposes of the **ES**.

Waste Management Regulations 2016

- 1.2.14 The Waste Management Regulations 2016 (Ref. 1.9) establish the legislative framework for the management, recovery, transport and disposal of waste and state that excavated material generated by the development of land may be subject to waste regulatory controls to ensure that waste does not harm human health or the environment.

Landfill (England and Wales) Regulations 2005

- 1.2.15 The Landfill Regulations 2005 (Ref. 1.10) establish procedures and criteria for the classification and acceptance of waste at landfills.

Hazardous Waste (England and Wales) Regulations 2005

- 1.2.16 The Hazardous Waste (England and Wales) Regulations 2005 (Ref. 1.11) provide a regime for the control, transport and tracking of hazardous wastes in accordance with waste duty of care requirements. Compliance with the Hazardous Waste Management Regulations forms part of the tertiary mitigation for the purposes of the **ES**.

The Environmental Permitting (England and Wales) Regulations 2016

- 1.2.17 The Environmental Permitting (England and Wales) Regulations 2016 (Ref. 1.12) provide procedures for regulation and permitting of a wide range of activities which have the potential to impact upon the environment. With regard to land quality issues, the regulations allow for the re-use of soils and aggregates within a development provided that this can be achieved in a manner protective of the wider environment. Compliance with the Environmental Permitting Regulations forms part of the tertiary mitigation for the purposes of the **ES**.

ii. Policy

National Policy Statements

- 1.2.18 As stated in Volume 1, Chapter 3 of the **ES**, whilst other matters may constitute important and relevant considerations in the decision making process under section 105(2)(c) of the Planning Act 2008, significant weight should be given to the policies contained within the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 1.13) and the NPS for Nuclear Power Generation (NPS EN-6) (Ref. 1.14).
- 1.2.19 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.20 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1, paragraph 5.10.8	<i>“For developments on previously developed land, applicants should ensure that they have considered the risk posed by contaminated land.”</i>	A risk assessment and an impact assessment has been undertaken in the relevant topic chapters in Volumes 2 to 9 of this ES to assess the risk posed by current and historical potentially contaminative land uses on and surrounding the site.
EN1, paragraph 4.13.2	<i>“The ES should assess the health effects on human beings for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. Cumulative impact on health should also be considered.”</i>	Potential risks to human health which may arise during the construction, operation and removal and reinstatement (where applicable) phases of the Sizewell C Project are considered and addressed as part of the assessment section in the relevant topic chapters in Volumes 2 to 9 of this ES .
EN-6, paragraph 3.7.8	<i>“The contamination of soils and water resources can be mitigated through the Environmental Impact Assessment (EIA) process and managed through the possible implementation of Environmental Management Plans.”</i>	Mitigation measures which will be implemented to minimise disturbance of / remediate (if necessary) existing contamination and avoid creation of potential pollutant linkages will be identified within the relevant topic chapters in Volumes 2 to 9 of this ES and included in the Code of Construction Practice (CoCP) (Doc Ref. 8.11).

National Planning Policy Framework 2019

1.2.21 The National Planning Policy Framework (NPPF) (Ref. 1.15) states that local planning policies and decisions should contribute to and enhance the natural and local environment by:

- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils;
- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

1.2.22 With specific regard to ground conditions and pollution paragraph 178 of the NPPF states that planning policies and decisions should ensure that:

- a site is suitable for its proposed use, taking account of ground conditions and any risks arising from land instability. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- after remediation, as a minimum, land should not be capable of being determined as Contaminated Land as defined under Part IIA of the Environmental Protection Act (Ref 1.4); and
- adequate site investigation information, prepared by a competent person is available to inform these assessments.

Planning Practice Guidance 2019

- 1.2.23 The Planning Practice Guidance (PPG) (Ref. 1.16) issued by the Ministry of Housing, Communities and Local Government sits alongside the NPPF. With regard to land stability, PPG identified that the planning system has an important role in; minimising the risk and effects of land stability, ensuring that specific types of development are not placed in unstable locations without suitable precautions being implemented and should wherever possible bring unstable land back into productive use.
- 1.2.24 The PPG states that with regard to contamination the planning system provides a risk based approach which works alongside various other regulatory regimes (which are discussed in turn in the sections below). The implications of contamination for a new development should be considered by the local planning authority to the extent that is not addressed by other regimes.
- 1.2.25 Whilst responsibility for securing a safe development rests with the developer and/or landowner, the PPG states that local planning authorities should be satisfied that a proposed development, along with any necessary remediation works or proposed mitigation measures, will be appropriate for its location and not pose an unacceptable risk.

iii. Strategies

Government's 25 Year Environment Plan

- 1.2.26 A Green Future: Our 25 Year Plan to Improve the Environment (Ref. 1.17) lays out the Governments ambition to protect and enhance the environment. This includes aims to; embed an 'environmental net gain'

principle for all forms of development, minimise waste and reduce its environmental impacts by promoting reuse and to reduce pollution (to land, water and air).

c) **Regional**

1.2.27 There is no relevant regional policy.

d) **Local**

i. **Policy**

Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies

1.2.28 The Suffolk Coastal District Council (SCDC) Local Plan Core Strategy and Development Management Policies (Ref. 1.18) includes a Contaminated Land Strategy based on the Contaminated Land provisions contained in Part IIA of the Environmental Protection Act (Ref 1.4) which outlines the steps to be taken by the local authority in identifying potential contaminated sites in the district.

1.2.29 The 2013 Local Plan includes the following relevant policies:

- Strategic Policy SP12 – Climate Change. This policy seeks to mitigate the effects of new development on climate change by: *“Ensuring development minimises the use of natural resources by utilising recycled materials where appropriate”* and goes on to state that new development should *“...reduce waste and minimise the risk of pollution”*.
- Strategic Policy SP12 – Nuclear Energy. This policy identifies the local issues that need to be adequately addressed for the possibility of an additional nuclear power station at Sizewell. Local issues include construction management, the off-site need for associated land, and site decommissioning.
- Strategic Policy SP14 – Biodiversity and Geodiversity. This policy aims to protect and enhance biodiversity and geodiversity using a network of protected and designated sites.

Suffolk Coastal District Council Final Draft Local Plan

- 1.2.30 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.
- 1.2.31 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.
- 1.2.32 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006) (Ref. 1.18); the Core Strategy and Development Policies Development Plan Document (2013) (Ref. 1.19); and the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref. 1.20).
- 1.2.33 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.
- 1.2.34 The Final Draft Local Plan (Ref. 1.21) contains the following relevant policies:
- Policy SCLP3.4: Proposals for Major Energy Infrastructure Project which requires that potential impacts from such developments are identified and mitigated by; undertaking a robust environmental impact assessment, provision of measures for the eventual decommissioning and restoration of sites and implementation of appropriate monitoring measures during construction, operational and post operational phases to ensure mitigation measures remain relevant and effective.
 - Policy SCLP10.3: Environmental Quality which states that development proposals will be expected to protect the quality of the environment and to minimise and, where possible, reduce all forms of pollution and contamination. Development proposals will be considered in relation to impacts on soils and the loss of agricultural land and land contamination and its effects on sensitive land uses.

e) Guidance

1.2.35 This assessment has been undertaken in accordance with the following guidance documents:

- primary guidance for assessing and managing land contamination is presented in Contaminated Land Report (CLR) 11¹ (Ref. 1.22) and the Guiding Principles for Land Contamination (GPLC) (Ref. 1.23). These documents provide a technical framework for the identification and remediation of contamination through the application of a risk management process;
- The Definition of Waste: Development Industry Code of Practice (DoWCoP) (Ref. 1.24) constitutes a voluntary Code of Practice containing procedures for the sustainable re-use of soils as a resource for the development industry;
- The Design Manual for Roads and Bridges (DMRB) (2008) Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects (Ref. 1.25);
- DMRB (1993) Volume 11, Section 3, Part 11 Geology and Soils (Ref. 1.26);
- Department of the Environment (DoE) (1995) Industry Profiles for previously developed land, Environment Agency (Ref. 1.27);
- Construction Industry Research and Information Association (CIRIA) C552 (2001) Contaminated Land Risk Assessment – A Guide to Good Practice (Ref. 1.28);
- National House-Building Council (NHBC) and Environment Agency (2008) Guidance on the Safe Development of Housing on Land Affected by Contamination (R&D66) (Ref. 1.29);
- CIRIA C665 (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings (Ref. 1.30);
- British Standards (2015) BS 8485 +A1:2019 – Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (Ref. 1.21);

¹ It is noted that CLR11 is due to be withdrawn in December 2019 and replaced by updated online guidance: Environment agency (June 2019) Land contamination: Risk Management (LCRM).

- CIRIA C681 (2009) Unexploded Ordnance (UXO) – A Guide for the Construction Industry (Ref. 1.32);
- CIRIA C733 (2014) Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks (Ref. 1.33);
- CIRIA C682 (2009) The Volatile Organic Contaminants Handbook (Ref. 1.34);
- British Standards (2015) BS 5930 – Code of practice for ground investigations (Ref. 1.35);
- British Standards (2017) BS 10175:2011+A2:2017 – Code of Practice for Investigation of Potentially Contaminated Sites (Ref. 1.36);
- Network Rail (NR) Standard NR-L2-ENV-015 (environment and social minimum requirements) (Ref. 1.37);
- Network Rail Standard NR/L3/ENV/044, Track Maintenance, renewal or alteration – Used ballast handling, (Ref. 1.38); and
- Network Rail Standard NR/L1/GRIP/100 - Governance for Railway Investment Projects (GRIP) process (Ref. 1.39).

1.3 Methodology

a) Scope of the assessment

- 1.3.1** The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2** This section provides a summary of the geology and land quality assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific additions to the methodology for geology and land quality are described within the relevant chapter of **Volumes 2 to 9** of the **ES**.
- 1.3.3** The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of the volume.

- 1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5 The Government's Good Practice Guide for EIA (Ref. 1.40) states that the following potential environmental effects should be considered for geology and land quality:
- physical effects of the development: e.g. changes in topography, soil compaction, soil erosion, ground stability, etc.;
 - effects on geology as a valuable resource: such as mineral resource sterilisation, loss or damage to regionally important geological sites, geological Sites of Special Scientific Interest (SSSIs) etc.;
 - effects on soil as a valuable resource: such as loss or damage to soil of good agricultural quality;
 - effects associated with ground contamination that may already exist on-site: such as introducing or changing pathways and receptors;
 - effects associated with the potential for polluting substances used (during the various phases) to cause new ground contamination issues on-site, such as introducing or changing the source of contamination and, or pathways; and
 - effects associated with re-use of soils and waste soils: such as re-use of site-sourced materials on-site or off-site, disposal of site-sourced materials off-site, importation of materials to the site etc.
- 1.3.6 The proposed main development site and proposed associated developments are unlikely to impact on important geology sites as no geological SSSIs or Local Geological Sites have been identified within the study areas. However, given the revised Scoping Opinion, see **Appendix 6B** of this volume, received in 2019, assessment of the effects on mineral resources (i.e. mineral reserves which have a potential to be extracted for economic purposes) has been included.
- 1.3.7 Physical effects in relation to changes in topography are discussed in landscape and visual chapter for each site, see **Volume 2, Chapter 13** and **Volumes 3 to 9, Chapter 6** of the **ES**. The effects on soil as a valuable resource are discussed in the soils and agriculture chapter for each site, see **Volume 2, Chapter 17** and **Volumes 3 to 9, Chapter 10** of the **ES**. Management of site-sourced waste materials, other than soils (i.e. general

waste materials from construction, operational and removal and reinstatement phases) is discussed in **Volume 2, Chapters 8** and **Volumes 3 to 9, Chapter 2** of the **ES**.

- 1.3.8 The remaining environmental effects have been considered and form part of the geology and land quality assessment.
- 1.3.9 Potential impacts from existing and new contamination sources on controlled waters have been considered as part of the geology and land quality assessment in the development of the conceptual site model to determine and classify potential effects. However, further description of the effects from contamination to groundwater and surface water are provided in **Volume 2, Chapter 19** and **Volumes 3 to 9, Chapter 12** of the **ES**.

b) Consultation

- 1.3.10 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees including Suffolk County Council (SCC) and the Environment Agency throughout the design and assessment process. Specific comments on the assessment of the main development site and associated developments are included within the respective ES volumes, where relevant. A summary of general comments raised and SZC Co.'s responses are detailed in **Table 1.2**.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the geology and land contamination assessment.

Consultee	Date	Summary of Discussion/Comments
SCC	Various	<p>Details of the scope of the geology and land quality assessment have been consulted on over the course of the Sizewell C Project including the proposed study area (500m) and methodology for the assessment of effects. SCC has also been provided with the Phase 2 Geo-Environmental Interpretative Report for the site, provided in Appendix 18A for comment.</p> <p>SCC is in general agreement with the proposed scope of the assessment and study area. SCC noted that the previous ground investigations undertaken across the site have not indicated any significant forms of contamination. Further discussion in relation to the previous ground investigations is provided in section 18.4 and Appendix 18A of Volume 2.</p> <p>SCC noted that additional sampling would need to be carried out to inform construction works and remediation/validation undertaken if contamination is identified. Proposed mitigation measures for construction works are provided in the various ES chapters and set out within the CoCP (Doc Ref. 8.11).</p>

Consultee	Date	Summary of Discussion/Comments
		It was also noted that details of materials to be-reused on-site would need to be provided to SCC and the Environment Agency. Further discussion on materials re-use is provided in the various ES chapters and set out within the CoCP (Doc Ref. 8.11) and Materials Management Strategy provided in Volume 2, Chapter 3 of the ES .
Environment Agency (EA)	Various	<p>Details of the scope of the geology and land quality assessment have been consulted on over the course of the Sizewell C Project including the proposed study area (500m) and methodology for the assessment of effects. The Environment Agency has also been provided with the Phase 2 Geo-Environmental Interpretative Report for the site, included in Appendix 18A for comment.</p> <p>The Environment Agency is in general agreement with the proposed scope of the assessment and study area. The Environment Agency has also agreed that the conclusions and recommendations of the Phase 2 Report are appropriate.</p> <p>The Environment Agency noted that the additional site walkover and intrusive investigation proposed in the Phase 2 report would provide further information in relation to contamination at the site and the requirement for remediation. It was also noted that any risks identified should be addressed through detailed risk assessment and piling risk assessment where appropriate.</p> <p>Details of the findings from the additional site walkover are provided in the various ES chapters. Proposed mitigation measures are provided in the various ES chapters and set out within the CoCP (Doc Ref. 8.11).</p>

c) Study area

i. Physical effects, and effects associated with mineral resources, waste soils and soil re-use

1.3.11 To consider the physical effects of the Sizewell C Project, the effects on mineral resources, and effects associated with the re-use of soils and waste soils, the study area for both the main development site and the associated development sites is defined as the area within the site boundary (i.e. the site).

ii. Land contamination

1.3.12 The study area for the consideration of effects on human receptors, controlled waters, ecological receptors and property receptors for both main development site and the associated developments includes the site and land immediately beyond it to a distance of 500 metres (m). This takes into account the transport and final destination of potential contaminants of

concern in the environment and the connectivity of these contaminants via pathways of migration or exposure to the receptors identified.

1.3.13 A 500m zone is commonly used for the initial consideration of potential land contamination and associated potential contaminant linkages (PCL)² risks for sites such as the proposed development, where the land has undergone limited development and as such contamination is likely to be limited in extent or have a limited lateral mobility if present. If the presence of mobile contaminants and pathways within the study area is confirmed, then the study area may be extended to identify additional receptors forming PCLs, and has been considered on a site by site basis. However, based on the contaminated land desk studies provided in **Volume 2, Appendix 18A** and **Volumes 3 to 9, Appendix 11A** of the **ES**, an extension of the study area beyond 500m for either the main development site or the associated development sites has been deemed not to be necessary.

1.3.14 The assessment provides an initial indication of chronic long-term risks to construction and maintenance workers. In accordance with the **CoCP**, short-term acute risks should be assessed, managed and mitigated by the Contractor with appropriate risk assessments and methods statements (RAMS), and subsequent control measures.

d) Assessment scenarios

1.3.15 The assessment of effects on geology and land quality includes the assessment of the entire construction and operational phases for the Sizewell C Project, and removal and reinstatement phase where relevant, rather than specific assessment years.

e) Assessment criteria

1.3.16 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. For physical effects and effects associated with mineral resources, waste soils, and soil re-use, the assessments broadly consider the magnitude of impacts and value/sensitivity of resources or receptors that could be affected in order to classify effects. For land contamination the assessment considers the change in the level of contaminative risks to the relevant receptors in order to classify effects.

² Where a linkage exists or is considered likely to be present between a potential contamination hazard/source, pathway and receptor relevant to the site.

1.3.17 A summary of the two assessment methods and assessment criteria used in the geology and land quality assessment is presented in the following sub-sections.

- i. **Physical effects and effects associated with mineral resources, waste soils and soil re-use**

1.3.18 An impact assessment of the potential physical effects of the Sizewell C Project on geology and the effects associated with mineral resources, soils re-use and waste soils has been undertaken using a qualitative approach which considers the effects of the construction, operation and reinstatement and removal phases of the Sizewell C Project.

Value/sensitivity

1.3.19 The value/sensitivity of a receptor is considered when determining the consequence of an effect in the impact assessment. Where the attribute falls within two value/sensitivity criteria, the worst case value/sensitivity is selected. The criteria used in the assessment for determining the value / sensitivity of soil and geological receptors are set out in **Table 1.3**.

Table 1.3: Assessment of the value or sensitivity of soil and geological receptors/resources.

Value / Sensitivity	Criteria	Description
High	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a very low capacity to accommodate the proposed change.	Regionally important mineral resource. Within a Mineral Safeguarding Area. Major ground stability, soil compaction or erosion hazards currently present at the site. High potential for soils re-use.
Medium	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a low capacity to accommodate the proposed change.	Moderately economically viable mineral resource. Adjacent to a Mineral Safeguarding Area. Moderate ground stability, soil compaction or erosion hazards currently present at the site. Moderate potential for soils re-use.
Low	Attribute only possesses characteristics which are locally significant. Attribute has some tolerance to accommodate the proposed change.	Low economically viable minerals. Low ground stability, soil compaction or erosion hazards currently present at the site.

Value / Sensitivity	Criteria	Description
		Limited opportunity for soils re-use.
Very Low	Attribute characteristics do not make a significant contribution to local character or distinctiveness. Attribute is generally tolerant and can accommodate the proposed change.	No economically viable minerals. No ground stability, soil compaction or erosion hazards currently present at the site. No opportunity for soils re-use.

Magnitude

- 1.3.20 Following determination of the value/sensitivity of the receptors, the magnitude of potential impacts are determined. The criteria for the assessment of impact magnitude for physical effects and effects associated with waste soils and soil re-use are shown in **Table 1.4**.

Table 1.4: Assessment of magnitude of impact for physical effects and effects associated with mineral resources, waste soils and soil re-use.

Magnitude	Criteria
High	Total loss or major alterations to one or more of the key elements, features or characteristics of the baseline. The situation will be fundamentally different.
Medium	Partial loss or alteration to one or more of the key elements or characteristics of the baseline. The situation will be partially changed.
Low	Minor loss or alteration to one or more of the key elements, features or characteristics of the baseline. The change will be discernible but the underlying situation will remain similar to the baseline.
Very Low	Very minor loss or alteration to one or more of the key elements, features or characteristics of the baseline, such that the change will be barely discernible, approximating to the 'no change' situation.

Effect definitions

- 1.3.21 The overall significance of physical effects and effects associated with mineral resources, waste soils and soil re-use is defined using the matrix presented below in **Table 1.5** which describes the relationship between the value/sensitivity of the receptor and the magnitude (change) of the impact.
- 1.3.22 Following the classification of an effect as presented in **Table 1.6**, a clear statement is made in the assessment as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

Table 1.5: Criteria for determining the significance of physical effects and effects associated with mineral resources, waste soils and soil re-use.

		Value / Sensitivity of Receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

1.3.23 Physical effects, and effects associated with mineral resources, waste soils and soil re-use are then described as adverse/negative or beneficial/positive considering the value of the receptor, the area over which the impact may occur, whether the impact is direct or indirect, the duration of the impact (short-term: under three years, medium term: three to ten years or long-term: over ten years), and whether the impact is permanent or temporary.

1.3.24 The classifications of physical effects and effects associated with mineral resources, waste soils and soil re-use are described in **Table 1.6**.

Table 1.6: Classification of Effects.

Classification	Effect
Major adverse	Major sterilisation of mineral resources from either an active mining /quarrying site or mineral safeguarding area. Significant soil erosion, soil compaction or ground instability that is permanent in nature. The generation of significant volumes of soils classified as hazardous waste requiring off-site disposal.
Moderate adverse	Moderate sterilisation of a mineral resource or mineral safeguarding area. Moderate soil erosion, soil compaction, or ground instability that is either permanent or long term in nature. The generation of moderate volume of waste requiring off-site disposal.
Minor adverse	Minor sterilisation of a mineral resource or mineral safeguarding area. Limited medium-term soil erosion, soil compaction, or ground instability. The generation of a minor amount of waste soil requiring off-site disposal.
Negligible	No change to a mineral resource or mineral safeguarding area. No measurable impact on soil erosion, soil compaction, waste volumes, or ground instability or impacts that are only temporary in nature (less than three years).

Classification	Effect
Minor beneficial	<p>Minor improvement in access to a mineral resource potentially facilitating future mineral extraction.</p> <p>Limited medium-term reduction in existing soil erosion, soil compaction, or ground instability issues.</p> <p>A minor amount of soil re-use on-site, thereby reducing off-site disposal volumes.</p>
Moderate beneficial	<p>Moderate improvement in access to a mineral resource facilitating future mineral extraction.</p> <p>Moderate permanent or long-term reduction in existing soil erosion, soil compaction, or ground instability issues.</p> <p>A moderate amount of soil reuse as part of the development, thereby reducing off-site disposal volumes by a significant extent.</p>
Major beneficial	<p>Major improvement in access to a mineral resource facilitating future mineral extraction.</p> <p>Significant permanent reduction in existing soil erosion, soil compaction or ground instability issues.</p> <p>Sustainable reuse of materials on-site with no, or only minimal, off-site disposal of waste soils.</p>

ii. Land contamination

1.3.25 The generic EIA methodology as described in **Volume 1, Chapter 6** of the **ES** is not used to consider the effects on land contamination from the Sizewell C Project. Instead, the assessment considers the risks to various receptors from land contamination and the change in this risk profile during construction, operation and, where relevant, removal and reinstatement. As such the magnitude of the impact is not determined, being replaced by the change in risk level to the various receptors, which is subsequently used to define the effect.

1.3.26 The assessment of the potential impacts of the Sizewell C Project on land contamination is undertaken over two stages including:

- stage 1 – a land contamination risk assessment; and
- stage 2 – a land contamination impact assessment.

Stage 1 – Risk assessment

1.3.27 The approach for the ground conditions risk assessment is based on the guidance document CLR 11 (Ref. 1.22) and the Good Practice Guide for

EIA (Ref. 1.40). These documents provide a technical framework for the application of a risk management process through the following steps:

- **develop a preliminary conceptual site model (PCSM)** – a desk study review of available documentary information has been undertaken to develop the PCSM, which describes the linkage between potential contamination hazards/sources, pathways and receptors relevant to the sites and where all three are present or considered likely to be present, described as PCLs which can then be subject to the risk assessment process; and
- **risk assessment** – based on the desk study information, a PCSM has been developed and a qualitative risk assessment has been undertaken in accordance with relevant guidance, considering the potential sources, pathways and receptors present during the baseline, construction, operational and removal and reinstatement phases. Where available, ground investigation data has been used to undertake a generic quantitative risk assessment (GQRA) for human and controlled waters receptors.

1.3.28 To assist in the risk assessment process and by helping to determine the consequence of contamination being present, a value/sensitivity has been assigned to each of the contaminated land receptors. The definition of each of these is given in **Table 1.7**.

Table 1.7: Assessment of the value or sensitivity of receptors associated with land contamination.

Value / Sensitivity	Criteria	Description
High	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a very low capacity to accommodate the proposed change.	Principal aquifer providing potable water to a large population, within an inner or outer groundwater source protection zone (SPZ) i.e. SPZ 1 or SPZ 2. WFD high status water body (surface water) providing potable water to a small population. Sensitive human health receptors, e.g. children/other users of residential areas, schools and parks. Buildings, including services and foundations but of high historic value or other sensitivity e.g. statutory historic designations, schools, residential dwellings. Ecological statutory designations with high sensitivity or international designations e.g. Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar sites etc.

NOT PROTECTIVELY MARKED

Value / Sensitivity	Criteria	Description
		Crops and livestock with a high commercial/economic value.
Medium	<p>Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor.</p> <p>Attribute has a low capacity to accommodate the proposed change.</p>	<p>Principal aquifer beyond a SPZ.</p> <p>Secondary aquifer providing abstraction water for single private potable water supplies, agricultural or industrial use.</p> <p>WFD good status water body (surface water).</p> <p>Moderate sensitivity human health receptors, e.g. commercial/industrial users.</p> <p>Buildings and infrastructure of high regional value or high sensitivity e.g. schools, hospitals, residential dwellings.</p> <p>Ecological statutory designations with medium sensitivity or national designations e.g. SSSI, National Nature Reserve (NNR), Area of Outstanding Natural Beauty (AONB), Marine Conservation Zone (MCZ) etc.</p> <p>Crops and livestock with a medium commercial/economic value.</p> <p>Local Geological Site (LGS) or Regionally Important Geological Sites (RIGS) etc.</p>
Low	<p>Attribute only possesses characteristics which are locally significant.</p> <p>Attribute has some tolerance to accommodate the proposed change.</p>	<p>Secondary aquifer not currently used for groundwater abstraction.</p> <p>WFD moderate status (surface water).</p> <p>Less sensitive human health receptors, e.g. construction workers using mitigation measures.</p> <p>Buildings and infrastructure of local importance or low sensitivity (commercial/industrial buildings, main roads, railways).</p> <p>Ecological statutory designations with low sensitivity or sites with local designations e.g. Local Nature Reserve.</p> <p>Crops and livestock with a low commercial/economic value.</p>
Very Low	<p>Attribute characteristics do not make a significant contribution to local character or distinctiveness.</p> <p>Attribute is generally tolerant and can accommodate the proposed change.</p>	<p>Non-productive strata (groundwater).</p> <p>WFD poor status (surface water).</p> <p>No sensitive human receptors.</p> <p>Locally important infrastructure (local roads, bridges, footpaths).</p> <p>Land with low sensitivity and/or non-statutory designations.</p> <p>No crop or livestock receptors.</p>

- 1.3.29 The risk assessment then applies the principles given in the NHBC and Environment Agency report R&D66 (Ref. 1.29) and CIRIA C552 (Ref. 1.28), which provide guidance on the preparation and application of the consequence and probability matrix, as presented in **Table 1.8** below, for contaminated land risk assessment.
- 1.3.30 The potential risk to a receptor is a function of the probability and the consequence of a PCL being realised. Probability (likelihood of an event occurring) takes into account both the presence of the hazard and the receptor and the integrity of the exposure pathway. Consequence takes into account both the potential severity of the hazard and the value/sensitivity of the receptor. Definitions of probability, consequence and the classified risks, as given in R&D66 (Ref. 1.29), adopted for this assessment are provided in **Annex 6N.1**.

Table 1.8: Land quality estimation of the level of risk by comparison of consequence and probability.

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

- 1.3.31 The descriptions of the classified risks and likely action required as given in R&D66 (Ref. 1.29), are defined in **Table 1.9** below.

Table 1.9: Description of classified risks for contamination.

Risk	Description
Very high risk	There is a high probability that severe harm could arise to a receptor from an identified hazard at the site without remediation action or there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High risk	Harm is likely to arise to a receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify

Risk	Description
	the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur, it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low risk	It is possible that harm could arise to a receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very low risk	It is a low possibility that harm could arise to a receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
No potential risk	There is no potential risk if no pollution linkage has been established.

1.3.32 A PCSM has then been produced based on the information available at the time of writing and considering the potential sources, pathways and receptors present during the baseline, construction, operational and, where relevant the removal and reinstatement phases. The PCSM has been characterised using the above method and taking into account probability, consequence and levels of risk. The PCSM was then used to inform the baseline, construction phase, operation and removal and reinstatement phase PCSMs, which consider the current site conditions and predictions relating to the various phases.

Stage 2 – Impact assessment

1.3.33 The impact assessment has been undertaken by comparing the baseline risk assessments with the construction, operation and removal and reinstatement (where relevant) phase risk assessments. This approach enables changes in the contaminated land status during the various phases to be identified and recorded.

Effect definitions

1.3.34 The effects of the Sizewell C Project on land contamination are described as adverse/negative or beneficial/positive, and major, moderate, minor or negligible on the basis of the impact assessment completed. The classifications of these effects for land contamination follows the guidance detailed in **Table 1.10**.

Table 1.10: Classification of effects.

Classification	Effect
Major adverse	An increase in contamination risk from the existing baseline conditions of four or five risk levels in the risk matrix, e.g. land that has a very low contamination risk in the baseline becomes a high or very high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part IIA of the Environmental Protection Act 1990 (Ref. 1.4).
Moderate adverse	An increase in contamination risk from the existing baseline conditions of two or three risk levels in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate or high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part IIA IIA of the Environmental Protection Act 1990 (Ref. 1.4).
Minor adverse	An increase in contamination risk from the existing baseline conditions of one risk level in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate to low risk.
Negligible	No change in contamination risks.
Minor beneficial	A reduction in contamination risk from the existing baseline conditions of one risk level in the risk matrix, e.g. land that has a moderate to low contamination risk in the baseline becomes a low risk.
Moderate beneficial	A reduction in contamination risk from the existing baseline conditions of two or three risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate to low or low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part IIA of the Environmental Protection Act 1990 (Ref. 1.4).
Major beneficial	A reduction in contamination risk from the existing baseline conditions of four or five risk levels in the risk matrix, e.g. land that has a very high contamination risk in the baseline becomes a low or very low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part IIA of the Environmental Protection Act 1990 (Ref. 1.4).

1.3.35 Following the classification of an effect as presented in **Table 1.10** above, a clear statement is made as to whether the effect is 'significant' or 'not significant'. Major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant.

1.3.36 It should be noted that, given the information known at the time of writing, professional judgement has been applied in certain circumstances where the introduction or removal of a receptor has automatically triggered a minor adverse or minor beneficial effect.

f) Assessment methodology

i. General approach

1.3.37 The approach to the geology and land quality assessment comprises:

- establishing the baseline conditions for the study area with respect to geology, ground stability, hydrology, hydrogeology, contaminated land (including the potential for unexploded ordnance and ground gases) and historical uses;
- identification of potential impacts on identified resources and receptors from the construction, operation and removal and reinstatement phases of the proposed development;
- assessment of the significance of likely effects from the proposed development including the consideration of mitigation measures; and
- identification of any residual effects.

ii. Establishing the baseline

Existing baseline

1.3.38 The baseline assessment has relied on existing data, previous desk study and ground investigation reports, groundwater monitoring data, and historical records. A summary of the sources of baseline information for each chapter is provided in the relevant chapters of **Volumes 2 to 9** of the **ES**. The following general sources have been reviewed:

- historical mapping and additional environmental information including historical landfill information and contemporary trade directories provided in Envirocheck reports (Ref. 1.41);
- publicly available information from the British Geological Survey (BGS) (Ref. 1.42) online mapping resource;
- SCC Minerals Local Plan (Ref. 1.43);
- Suffolk Biodiversity Information Service website (Ref. 1.44);
- publicly available information from the Department of Environment, Food and Rural Affairs (Defra) Multi-Agency Geographic Information for the Countryside (MAGIC) website (Ref. 1.45);

- publicly available information from the Environment Agency accessed in 2016 (Ref. 1.46);
- the Yell website (Ref. 1.47); and
- Zetica online unexploded ordnance (UXO) risk maps (Ref. 1.48).

1.3.39 Site visits were undertaken for the main development site and associated development sites during the Stage 2 assessment, and also on 19th and 20th March 2019 to gain further information on the site settings and study area, to consider the context of the sites, and to support the desk study mapping and aerial photographs. Additionally, it provided an opportunity to identify potential visual or olfactory contamination present at the sites.

Future baseline

1.3.40 Changes to existing conditions were considered with due regard to committed developments, existing and proposed land uses. Where these aspects were considered to impact on baseline conditions in the future, these are described further under future baseline in the geology and land quality chapters in **Volumes 2 to 9** of the **ES**.

g) [Assessment of construction, operation and removal and reinstatement \(where applicable\)](#)

1.3.41 The methodology applied to the assessments of the Sizewell C Project has been described under the assessment criteria section, and considers the assessment of impacts on geology, mineral resources and the potential for land contamination. Further details on-site specific methodologies are provided in the site-specific chapters for the geology and land quality in **Volumes 2 to 9** of the **ES**.

h) [Inter-relationships](#)

1.3.42 Potential inter-relationship effects have been considered between the individual environmental effects arising from construction, operation and removal and reinstatement (where relevant) phases.

1.3.43 Inter-relationship effects considered to be relevant for the geology and land quality assessment include inter-relationship effects with soils and agriculture and groundwater and surface water in relation to sensitive/high value receptors such as good quality or best and most versatile (BMV) agricultural land, principal aquifers, Water Framework Directive rivers and

groundwater SPZs during construction works which could be impacted by ground contamination during the various phases of the Sizewell C Project.

i) **Assumptions and limitations**

1.3.44 The following assumptions have been made in this assessment:

- stockpiling of materials will be on the land within the site boundary of the development;
- construction works will include a vegetation/topsoil strip; and
- for temporary developments, post-operation the sites will be restored back to the original land use and as such all underground services, foundations and other above ground structures will be removed. If services are to be retained, then further risk assessments will be required prior to the removal and reinstatement of the development.

1.3.45 The following limitations have been identified:

- the baseline understanding of the geology underlying the main development site is based on a combination of existing ground investigation information and published BGS maps.
- limited ground investigation data is available for the temporary construction area, the land to the east of Eastlands industrial estate and the associated development sites and the baseline for these areas has been largely prepared using BGS mapping.

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³ Information was obtained from the Environment Agency's 'What's in Your Backyard' website in 2016 and has been used to inform the baseline assessment. It is noted that the website is no longer in use, but the data is still considered valid for the purposes of the assessment and has been updated where applicable with current data from other sources.

VOLUME 1, CHAPTER 6, APPENDIX 6N, ANNEX 6N.1:
DEFINITION OF PROBABILITY, CONSEQUENCE AND RISK

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Plates

None provided.

Figures

None provided.

1. Definition of Probability and Consequence

- 1.1.1 The following definitions of probability and consequence are adopted from the National House-Building Council & Environment Agency. Guidance on the Safe Development of Housing on Land Affected by Contamination. 2008. (R&D66) (Ref. 1.1).

Table 1.1 - Risk estimation - classification of probability

Classification	Definition of the probability of harm / pollution occurring
High Likelihood	The contaminant linkage exists and it is very likely to result in harm/pollution in the short term, and/or will almost inevitably result in harm/pollution in the long term, or there is current evidence of harm/pollution. Likelihood is defined as more likely than not and meets the definition of 'significant possibility' within Part 2A Contaminated Land Statutory Guidance (Ref. 1.2).
Likely	The source, pathway and receptor exist for the contaminant linkage and it is probable that harm or pollution will occur. Circumstances are such that harm or pollution is not inevitable, but possible in the short term and likely over the long term. Likelihood is defined as reasonably possible and meets the definition of 'significant possibility' within Part 2A Contaminated Land Statutory Guidance.
Low Likelihood	The source, pathway and receptor exist and it is possible that harm or pollution could occur. Circumstances are such that harm/pollution is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the contaminant linkage but it is improbable that harm or pollution will occur even in the long term.

Table 1.2 - Risk estimation - classification of consequence

Classification	Definition of consequence
Human Health Receptors – Site end user or other sensitive receptor	
Severe	Acute damage to human health based on the effects on the critical human receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Medium	Chronic damage to human health based on the effects on the critical human receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Mild	No appreciable impact on human health based on the potential effects on the critical human receptor. Concentrations of contaminants above generic assessment criteria but below appropriate site-specific assessment criteria.
Minor	No appreciable impact on human health based on the effects on the critical human receptor. Concentrations of contaminants below appropriate generic assessment criteria.
Human Health Receptors – Site construction / maintenance / future workers	

Classification	Definition of consequence
Severe	Exposure to hazardous substances resulting in a reportable death, major injury, 3-day injury or illness/disease under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) (2013) (Ref 1.3).
Medium	Exposure to hazardous substances resulting in a dangerous occurrence reportable under RIDDOR. Exposure to hazardous substances resulting in exceedance of a workplace exposure limit ¹ .
Mild	Exposure to hazardous substances resulting in limited effects such as headache, dizziness, nausea. Exposures below the workplace exposure limits. Not reportable under RIDDOR.
Minor	Minor exposure to hazardous substance resulting in no appreciable ill health effects.
Controlled Water Receptors	
Severe	Pollution of a Principal Aquifer within a source protection zone or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an Environmental Quality Standard (Ref. 1.4) at a statutory monitoring location or resulting in a change in General Quality Assessment (GQA) grade of river reach. Discharge of a List I or List II substance to groundwater. Pollution meets the Part 2A Contaminated Land Statutory Guidance definition.
Medium	Pollution of a Principal Aquifer outside a source protection zone or a Secondary A Aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach Pollution meets the Part 2A Contaminated Land Statutory Guidance definition.
Mild	Low levels of pollution of a Principal Aquifer outside a source protection zone or an industrial abstraction, or pollution of a Secondary Aquifer. Low levels of pollution insufficient to result in a change in the GQA grade of river reach, pollution of a surface water course without a quality classification.
Minor	No appreciable pollution, or pollution of a low sensitivity receptor such as a non-aquifer or a surface water course without a quality classification.
Property Receptors – Buildings, Foundations and Services	
Severe	Catastrophic damage to buildings, such as explosion. Catastrophic failure of foundations and services. Substantial damage to a Scheduled Monument significantly impairing the by reason of which the monument is scheduled. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Medium	Substantial damage to buildings and foundations rendering the structures unsafe. Substantial damage to services impairing their function. Significant damage to a Scheduled Monument significantly impairing the reason of which the monument is

¹ Workplace Exposure Limits are concentrations of hazardous substances in the air, averaged over a specified period of time, referred to as a time-weighted average.

Classification	Definition of consequence
	scheduled. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Mild	Significant damage to buildings and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function. Damage to a Scheduled Monument but no significant impairment to the reason of which the monument is scheduled.
Minor	Easily repairable damage to buildings, foundations and services.
Property Receptors – Crops and Livestock and Ecological Receptors	
Severe	Substantial loss in the value of crops or domestically-grown produce. Death to livestock, domesticated animals or wild animals subject to shooting or fishing rights. A short-term risk to a particular ecosystem or organism forming part of such ecosystem. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Medium	Substantial diminution in yield (over 20% reduction) of crops or domestically-grown produce. Serious disease or other serious physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights. A significant change in a particular ecosystem, or organism forming part of such ecosystem. Harm meets definition of 'significant harm' within the Part 2A Contaminated Land Statutory Guidance.
Mild	Harm to crops but not resulting in a substantial loss in value or diminution in yield (less than 20% reduction). Limited harm in terms of disease or other physical damage to ecosystems, livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Minor	No appreciable harm, or harm to a low sensitivity receptor.

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VOLUME 1, CHAPTER 6, APPENDIX 6O: GROUNDWATER AND SURFACE WATER LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1 Groundwater and Surface Water Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant groundwater and surface water effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites relating to groundwater and surface water, unless otherwise indicated in the topic chapters of the site assessment volumes, see **Volumes 2 to 9 of the Environmental Statement (ES)**. Any site-specific additions to the methodology are described within those volumes.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project relating to groundwater and surface water as described in the following **ES** chapters:

- **Volume 2, Chapter 19;** and
- **Volumes 3 to 9, Chapter 12;**

1.1.3 The assessment of contamination on groundwater and surface water receptors has been based on the Conceptual Site Models included within the relevant appendices to the geology and land quality chapters, provided in **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** of the **ES**. The assessment of effects related to flood risk and Water Framework Directive (WFD) compliance has been based on site specific **Flood Risk Assessments (FRA)** (Doc Ref. 5.2 to 5.9) and **WFD Compliance Assessments** (Doc Ref. 8.14).

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant groundwater and surface water effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level, and has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. Water Framework Directive 2000/60/EC

1.2.3 The WFD (Ref. 1.1) is a European Union (EU) directive intended to improve and integrate the way water, from all sources, is managed throughout Europe. It aims to prevent any further deterioration of surface waters and groundwater and provides a framework under which EU member states are committed to:

- protect the ecological status of surface water bodies from deterioration and, where necessary and proportionate, aim to restore surface water bodies to good status; and
- to achieving good qualitative and quantitative status of groundwater bodies.

1.2.4 Unlike the EU Birds and Habitats Directives (European Commission Directive on the Conservation of Wild Birds (Ref. 1.2) and European Commission Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Ref. 1.3), respectively), which apply only to designated sites, the WFD applies to all water bodies (rivers, lakes, estuaries, coastal waters and groundwater) including those that are man-made.

1.2.5 A standalone **WFD Compliance Assessment** of the Sizewell C Project has been prepared and submitted for examination as part of the Development Consent Order application (Doc Ref. 8.14). The assessment provides more detailed explanation of the WFD.

ii. Groundwater Daughter Directive 2006/118/EC

1.2.6 The Groundwater Daughter Directive (Ref. 1.4) provides details on groundwater quality standards and measures required to achieve the aims of the WFD, to limit groundwater pollution and achieve good chemical status.

iii. The Discharge of Dangerous Substances into the Aquatic Environment Directive 2006/11/EC

1.2.7 The Discharge of Dangerous Substances into the Aquatic Environment Directive (Ref. 1.5) provides details on surface water quality standards and measures required in order to achieve the aims of the WFD, to limit surface water pollution and achieve good chemical status.

b) National

i. Legislation

[Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations 2017](#)

1.2.8 The WFD was transposed into national law in the UK by means of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (Ref. 1.6). These regulations were repealed and replaced by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 1.7).

1.2.9 The 2017 Regulations provide for the implementation of the WFD, from designation of all surface waters (rivers, lakes, estuarine waters, coastal waters and ground waters) as water bodies, and set objectives for the achievement of good ecological status (GES) or good ecological potential (GEP).

[Water Framework Directive \(Standards and Classification\) Directions \(England and Wales\) 2015](#)

1.2.10 The standards used to determine the ecological or chemical status of a water body are provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (Ref. 1.8). This includes the thresholds for determining the status of the biological, hydromorphological, physico-chemical and chemical status of surface water bodies, and the quantitative and chemical status of groundwater bodies.

[Environmental Permitting Regulations \(England and Wales\) 2016](#)

1.2.11 The Environmental Permitting Regulations (England and Wales) 2016 (Ref. 1.9) provides the environmental permitting regime for industrial activities, waste management and discharges to surface water and groundwater, with the aim to protect the environment to statutory and Government policy environmental targets and outcomes.

[Water Resources Act 1991](#)

1.2.12 The Water Resources Act 1991 (Ref. 1.10), amongst other things, sets out a framework for licensing of the abstraction and impoundment of water.

1.2.13 The Water Act 2003 (Ref. 1.11) amended the Water Resources Act 1991 to make additional provision in connection with land drainage, abstraction and flood defence.

Flood and Water Management Act 2010

- 1.2.14 The Flood and Water Management Act 2010 (Ref. 1.12) aims to improve both flood risk management and the way in which water resources are managed by creating clearer roles and responsibilities. This includes a new lead role for local authorities in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role of all flood risk for the Environment Agency. The 2010 Act provides opportunities for a more comprehensive, risk-based approach on land use planning and flood risk management by local authorities and other key partners.

ii. Planning policies

National Policy Statements

- 1.2.15 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.13) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.14). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.16 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a development consent order. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.17 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1 5.15.2	<i>"Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent."</i>	A mix of qualitative and quantitative assessments have been undertaken based on available published and site-specific information and is presented within the relevant groundwater and surface water chapters, see Volumes 2 to 9 of the ES .
EN-1 5.15.3	<i>"The ES should in particular describe:</i>	A qualitative assessment of the elements listed has been

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<ul style="list-style-type: none"> <i>the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;</i> <i>existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies);</i> <i>existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and</i> <i>any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and Source protection zones (SPZs) around potable groundwater abstractions."</i> 	undertaken based on available published and site-specific information and is presented within the relevant groundwater and surface water chapters, see Volumes 2 to 9 of the ES .
EN-1 5.15.9	<i>"The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked."</i>	Design proposals include appropriate mitigation measures, as summarised within the relevant groundwater and surface water chapters, see Volumes 2 to 9 of the ES .
EN-6 3.6.11	<i>"Applicants need to submit a flood risk assessment in accordance with Section 5.7 of EN-1. The Infrastructure planning commission (IPC) [now the Secretary of State] will need to be satisfied that a sequential approach has been applied at the site level to ensure that, where possible, critical infrastructure is located in the lowest flood risk areas within the site."</i>	Flood risk assessments for each of the sites have been undertaken and submitted as part of this development Consent Order application (Doc Ref. 5.2 to 5.9). The assessment findings inform the relevant groundwater and surface water chapters, see Volumes 2 to 9 of the ES .
EN-6 3.6.12	<i>"The IPC [now the Secretary of State] is still required to consider the Exception Test in accordance with Section 5.7 of EN-1 where the site is located in Flood Zone 3."</i>	The flood risk assessments (Doc Ref. 5.2 to 5.9) present evidence to inform this test.
EN-6 3.6.15	<i>"The IPC [now the Secretary of State] should be satisfied that the applicant is able to demonstrate suitable flood risk mitigation measures. These</i>	The flood risk assessments (Doc Ref. 5.2 to 5.9) present evidence to inform this test.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>mitigation measures should take account of the potential effects of the credible maximum scenario in the most recent marine and coastal projections. Applicants should demonstrate that future adaptation/flood mitigation would be achievable at the site, after any power station is built, to allow for any future credible predictions that might arise during the life of the station and the interim spent fuel stores."</i>	
EN-6 3.7.4	<i>"The IPC [now the Secretary of State] should consider the cumulative effects of a development consent application for the construction of a new nuclear power station at a specific site with other major infrastructure proposals in accordance with the requirements of EN-1."</i>	The flood risk assessments (Doc Ref. 5.2 to 5.9) and cumulative impact assessment, provided in Volume 10 of the ES , consider the cumulative effects of the Sizewell C Project with other major infrastructure proposals.
EN-6 3.7.5	<i>"The IPC [now the Secretary of State] should liaise closely with the EA who will consider issues of water quality (including any water abstraction and discharge) as part of the environmental permitting process."</i>	As part of the pre-application process, SZC Co. have consulted on the development proposals and associated assessment work in support of the Development Consent Order application and the relevant permits.
AoS 5.69	<i>"There is potential for adverse effects on soil structure which are likely to impact upon groundwater and future potential land use. Such effects can be mitigated by minimising the development's footprint and adopting soil and water management best practice during construction."</i>	Appropriate best practice measures would be adopted as per the Code of Construction Practice (CoCP) (Doc Ref. 8.11).
AoS 5.76	<i>"Effects on groundwater could lead to adverse impacts on groundwater-dependent surface water features and aquatic ecosystems, including internationally and nationally designated water-related nature conservation sites."</i>	A qualitative assessment has been undertaken based on available published and site-specific information and is presented the relevant groundwater and surface water chapters, see Volumes 2 to 9 of the ES .
AoS 5.77	<i>"A further significant effect could occur as a result of the impact of the development on the quality and quantity of groundwater at the site. The site lies on the Crag Formation, a Principal Aquifer, which is underlain by the Chalk, also a Principal Aquifer. Groundwater from the Crag is currently used for water supply in the vicinity of the site. Accidental discharges or construction disturbance could cause deterioration in groundwater quality and flow quantity. Impacts on the groundwater can be mitigated through good environmental management</i>	Appropriate mitigation measures would be adopted as per the CoCP .

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<i>processes during construction, operation and development stages."</i>	

National Planning Policy Framework (NPPF)

- 1.2.18 The NPPF (Ref. 1.15) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).
- 1.2.19 The NPPF states that new and existing developments should be prevented from contributing to water pollution. It states that local plans should take account of climate change over the long-term, including factors such as flood risk, water supply and coastal change (paragraph 170).

c) Regional

Environment Agency Anglian River Basin Management Plan

- 1.2.20 The Sizewell C Project lies within the Environment Agency Anglian River Basin Management Plan (RBMP) (Ref. 1.16). The plan describes the river basin district, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures. The RBMP sets out the baseline classification of water bodies, statutory objectives for protected areas and water bodies, and a programme of measures to achieve these statutory objectives. It outlines what improvements are possible by 2021 (or 2027 at latest) and how the actions will make a difference to the local environment – the catchments, the estuaries and coasts, and the groundwater.

The East Suffolk Abstraction Licensing Strategy 2017

- 1.2.21 The East Suffolk Abstraction Licensing Strategy (Ref. 1.17) covers the East Suffolk Catchment area of the Anglian River Basin District (RBD). The East Suffolk Abstraction Licensing Strategy sets out the Environment Agency's approach to the management of water resources in the catchment and how this ensures that RBMP objectives for water resources activities are met and deterioration avoided. It provides information on where water is available for further abstraction and its reliability.

East Suffolk Catchment Flood Management Plan 2009

1.2.22 The Environment Agency’s East Suffolk Catchment Flood Management Plan (Ref. 1.18) considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding, to establish flood risk management policies which will deliver sustainable flood risk management for the long term.

1.2.23 Tidal locking from the River Minster is identified as a source of flood risk and it was identified that sea level rise will increase the probability of flooding and increase the length of time watercourses will not be able to flow freely to the sea at high tide (tide-locked). The Sizewell C Project is within Suffolk Coast and Heaths sub area (sub area 6), where policy 2 was identified as the preferred policy:

“Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions”

1.2.24 This policy has been applied as the current activity to manage flooding is out of proportion with the level of flood risk, or is not effective, therefore flood risk management activities will be reduced. However, where flood risk is more concentrated (for example in towns), or where an increase in river flooding would have a negative impact on an internationally designated conservation area, existing actions to manage flooding may be continued.

d) Local

1.2.25 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

1.2.26 Accordingly, there are two parts to ESC’s Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

1.2.27 The adopted Suffolk Coastal Local Plan (Ref 1.19) comprises the: ‘saved policies’ of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006) (Ref 1.20); the Core Strategy and Development Policies Development Plan Document (2013) (Ref. 1.21); and the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref 1.22).

1.2.28 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

Suffolk Coastal District Council Final Draft Local Plan

- 1.2.29 SCDC published the Final Draft Local Plan (Ref. 1.19) in January 2019. This contains several policies relevant to groundwater and surface water assessment:
- Policy Suffolk Coastal Local Plan 3.4: Proposals for Major Energy Infrastructure Projects, requires that potential impacts from such developments are identified and mitigated by; undertaking a robust environmental impact assessment, provision of measures for the eventual decommissioning and restoration of sites and implementation of appropriate monitoring measures during construction, operational and post operational phases to ensure mitigation measures remain relevant and effective.
 - Policy Suffolk Coastal Local Plan 9.5: Flood Risk, states that developments should exhibit the three main principles of flood risk, in that, they should be safe, resilient and should not increase flooding elsewhere.
 - Policy Suffolk Coastal Local Plan 9.6: Sustainable Drainage Systems (SuDS), states that developments should use SuDS to drain surface water. The SuDS should deliver sufficient and appropriate water quality and aquatic biodiversity improvements wherever possible and be complimentary of local designations such as SPZs.
 - Policy Suffolk Coastal Local Plan 9.7: Holistic Water Management, requires developments to demonstrate that water can be made available to support the development, with water efficiency and re-use measures expected to be incorporated, e.g. grey water recycling. Infrastructure that leads to a reduction in the amount of water released to the sewer system and allows for natural filtration into groundwater tables will be favoured.
 - Policy Suffolk Coastal Local Plan 10.3: Environmental Quality, states that development proposals will be expected to protect the quality of the environment and to minimise and, where possible, reduce all forms of pollution and contamination. Development proposals will be considered in relation to impacts on water quality and the achievement of WFD objectives.

Suffolk Flood Risk Management Strategy

- 1.2.30 The Suffolk Flood Risk Management Strategy (Ref. 1.23) sets out how flood risk should be managed across Suffolk. It identifies groundwater and surface water flooding as a potential source of flooding across parts of the county where:
- a shallow water table exists or where groundwater can flow up through springs; and
 - following intense rainfall events (greater than 30mm/hr) or prolonged rainfall when the ground is saturated and surface drainage networks become overwhelmed.
- 1.2.31 No incidences of problem groundwater and surface water flooding are identified in the vicinity of the Sizewell C Project, with problem groundwater flooding found more in the north-west of the county and surface water flooding in the vicinity of Ipswich and Lowestoft. As Lead Local Flood Authority, Suffolk County Council (SCC) has the powers to manage groundwater and surface water flood risk. However, in most cases, the responsibility is passed on to the riparian land owner with guidance provided by SCC.
- 1.2.32 Appendix A of the Suffolk Flood Risk Management Strategy (Ref. 1.24) outlines guidance, standards and information for application of SuDS in Suffolk. It draws on the Department for Environment, Food and Rural Affairs (Defra) Technical Standards (Ref. 1.25) and the Construction Industry Research and Information Association SuDS Manual C753 (Ref. 1.26).

Strategic Flood Risk Assessments

- 1.2.33 Suffolk Coastal and Waveney District Strategic FRA (Ref. 1.27) was prepared to ensure that flood risk is understood and managed in accordance with the NPPF (Ref. 1.15) and accompanying Planning Practice Guidance (PPG) (Ref. 1.28). The document identifies that sources of flooding in the district include tidal, fluvial, pluvial, groundwater, sewer and artificial. It notes that the most significant flood events occur when pluvial, fluvial and tidal flood sources combine.
- 1.2.34 The document identifies that the most significant flood events in the Suffolk Coastal and Waveney District tend to be associated with storm surges, coinciding with high spring tides to produce high tidal water levels along the coast and in estuaries. In addition, 'flash flooding' caused by run-off from saturated catchments has been a dominant source of historical flooding in the district. Both the 1993 and 2000 flood events that caused damage to

many areas in Suffolk Coastal and Waveney inundated areas of Leiston and Sizewell (Ref. 1.29).

- 1.2.35 Any new developments should ensure the rates and volumes of run-off are no greater than greenfield run-off rates and investigate tidal flooding and storm surge flooding and the status of local tidal flood defences, if relevant.

[Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies](#)

- 1.2.36 SCDC has prepared a Local Plan: Core Strategy and Development Management Policies (Ref. 1.21) to guide development across the District until 2027 and beyond. It identifies how the SCDC will manage and mitigate flood risk; and the conservation and efficient management of water resources, as key environmental issues for the district. The strategy states within Development Management Policy DM22 that ESC will also support and strongly encourage water conservation measures such as grey water systems, permeable soakaways and water efficiency devices.

e) [Guidance](#)

- 1.2.37 The assessment methodology for groundwater and surface water has been informed by published guidance.

[Planning Practice Guidance](#)

- 1.2.38 The PPG (Ref. 1.28) for water supply, wastewater and water quality supports the NPPF (Ref. 1.15) with additional guidance to ensure protection of the water environment e.g. steering potentially polluting developments away from the most sensitive areas such as designated SPZs.
- 1.2.39 The PPG for flood risk and coastal change supports the NPPF with additional guidance, e.g. opportunities for reducing flood risk such as the appropriate application of suitable drainage systems. The PPG makes use of the concepts of Flood Zones, Vulnerability Classifications and Compatibility to assess the suitability of a specific site for a certain type of development. It directs development away from areas at highest risk of flooding via the application of the Sequential Test. If, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied, if appropriate.

[Government's 25 Year Environment Plan](#)

- 1.2.40 A Green Future: Our 25 Year Plan to Improve the Environment (Ref. 1.30) sets out the Government's proposed action to help the natural world regain

and retain good health. It aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species and provide richer wildlife habitats. The 25 Year Environment Plan aims to expand the use of natural flood management solutions, incorporated alongside more traditional defences. The plan also aims to put in place more sustainable drainage systems to reduce surface water flooding and improve water quality.

1.2.41 The plan aims to improve water quality and reverse the deterioration of groundwater by minimising the risk of chemical contamination in water. This is reflected in the goal to attain clean and plentiful water through improving water quality in rivers and lakes, bathing waters, and groundwater, reducing abstraction from rivers and groundwater, and reducing inputs of hazardous substances.

1.2.42 The plan also places an onus upon the Environment Agency to ensure that new developments are flood resilient and do not increase flood risk. The Government also commits to working with nature to protect communities from flooding, slowing rivers and creating and sustaining more wetlands to reduce flood risk as well as woodland management and planting a greater number of trees to aid flood risk management.

Other relevant guidance

1.2.43 Assessment guidance for the water environment determines the assessment methodology approach undertaken. The relevant groundwater and surface water guidance documents used in the assessment are:

- The Government's Good Practice Guide (Ref. 1.31) for Environmental Impact Assessment (EIA).
- The Groundwater Protection Position Statements Guidance (Ref. 1.32) summarises the legislation relevant to the management and protection of groundwater and details the Environment Agency's approach to groundwater protection. The statements are not statutory requirements but may be included or referenced by statutory guidance and illustrate the Environment Agency's approach to a particular activity.
- Control of water pollution from construction sites: A guide to good practice, Construction Industry Research and Information Association (2001) (Ref. 1.33).
- Environment Agency's Pollution Prevention Guidelines: Working on construction sites (Ref. 1.34).

- The Design Manual for Roads and Bridges (2008) Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects (Ref. 1.35).
- The Design Manual for Roads and Bridges (2009) Volume 11, Section 3, Environmental Assessment Techniques (Ref. 1.36).

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 This section provides specific details of the groundwater and surface water assessment methodology. The scope of the assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable). Any site-specific differences to the methodology for groundwater and surface water are described within the relevant chapter of **Volumes 2 to 9** of the **ES**.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate (PINS). A request for an EIA Scoping Opinion was initially issued to the PINS in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5 The Government's Good Practice Guide for EIA (Ref. 1.29) states that the following potential environmental effects should be considered for water environment:
- levels and effects of emissions to water from the development;
 - abstractions of/effects on surface or groundwater resources;
 - effects of development on drainage or run-off pattern in the area;
 - changes to groundwater level, watercourses and flow of underground water;
 - crossings of watercourses; and
 - effects of pollutants on water quality.

- 1.3.6 Additionally, consideration should be given to flood risk as well as WFD compliance, and their interactions with other assessments such as geology and land quality, and terrestrial ecology and ornithology assessments.
- 1.3.7 Potential impacts from existing and new contamination sources on controlled waters have been considered as part of the geology and land quality assessment in the development of the site-specific conceptual site models to determine and classify potential effects, see **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** of the **ES**. However, the assessment of effects from contamination to groundwater and surface water is reported in the relevant groundwater and surface water chapters within **Volumes 2 to 9** of the **ES**.
- b) Consultation
- 1.3.8 The scope of the groundwater and surface water assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co's responses are detailed in **Table 1.2**. Specific comments on the assessment of the main development site and associated developments are included within the respective **ES** volumes, where relevant.
- 1.3.9 SZC Co. has held hydro-ecological workshops in liaison the Environment Agency, Natural England, Royal Society for the Protection of Birds (RSPB), SCC, SCDC and Suffolk Wildlife Trust (SWT) to discuss the approach of the groundwater and surface water assessments and potential ecological implications.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the groundwater and surface water assessment

Consultee	Date	Summary Of Discussion/Comments
Environment Agency, Natural England, RSPB, SWT	09 April 2014	Workshop to establish approach to groundwater assessment.
Environment Agency, Natural England, RSPB, SCC, SCDC, SWT	14 October 2014	Workshop to discuss hydrogeological conceptual site model.
Environment Agency, Natural England, RSPB, SCC, SCDC, SWT	09 December 2014	Workshop to discuss groundwater numerical modelling approach.
Environment Agency, Natural England, RSPB, SCC, SCDC, SWT	01 March 2015	Workshop to discuss surface water assessment.
Environment Agency, Natural England	12 May 2015	Workshop to discuss numerical modelling progress with technical specialist stakeholders.

Consultee	Date	Summary Of Discussion/Comments
Environment Agency, Natural England	07 July 2015	Teleconference to discuss numerical modelling progress with technical specialist stakeholders.
Environment Agency, Natural England, RSPB, SCC, SCDC, SWT	06 August 2015	Workshop to discuss Sizewell Marshes Site of Special Scientific Interest (SSSI) crossing options.
Environment Agency, Natural England, IDB, RSPB, SCC, SCDC, SWT	15 September 2015	Combined groundwater and surface water workshop to discuss alignment between assessment.
Environment Agency, Natural England	07 December 2015	Workshop to discuss numerical modelling progress with technical specialist stakeholders.
Environment Agency, Natural England, IDB, RSPB, SCC, SCDC, SWT	16 December 2015	Workshop to discuss preferred SSSI crossing option.
Environment Agency, Natural England	07 June 2016	Workshop to discuss numerical modelling progress with technical specialist stakeholders.
Environment Agency, Natural England, RSPB, SWT	27 July 2016	Workshop to discuss approach to eco-hydrological assessment.
Environment Agency, ESC, SCC.	27 February 2019	Workshop held to discuss flood risk technical approach.
Environment Agency, Natural England, ESC, RSPB, SCC, SWT	28 February 2019	Workshop to discuss groundwater, surface water and eco-hydrological assessment
Environment Agency, Natural England	03 April 2019	Workshop to discuss numerical modelling progress with technical specialist stakeholders.
Environment Agency.	18 April 2019	Telephone call held to discuss flood risk technical approach.
Environment Agency, SCC, Water Management Alliance.	18 April 2019	Telephone call held to discuss drainage strategy technical approach.
Environment Agency, SCC, Water Management Alliance.	9 May 2019	Workshop held to discuss flood risk technical approach.
Environment Agency, SCC, Water Management Alliance.	17 May 2019	Telephone call held to discuss drainage strategy technical approach.
Environment Agency, Natural England, ESC, RSPB, SCC, SWT	21 May 2019	Workshop to discuss groundwater, surface water and eco-hydrological assessment
SCC	11 June 2019	Workshop held to discuss drainage strategy technical approach.

Consultee	Date	Summary Of Discussion/Comments
Environment Agency, SCC, Water Management Alliance.	24 June 2019	Workshop held to discuss drainage strategy technical approach.
Environment Agency, Natural England, ESC, RSPB, SCC, SWT	18 July 2019	Workshop to discuss groundwater, surface water and eco-hydrological assessment
Environment Agency, Natural England, ESC, RSBP, SCC, Coastal Partnership East, Water Management Alliance.	14 August 2019	Telephone call held to discuss flood risk technical approach.
Environment Agency, Natural England.	18 September 2019	Teleconference held to discuss groundwater numerical modelling approach.
Environment Agency, ESC, SCC.	23 September 2019	Workshop held to discuss drainage strategy technical approach.

c) Study area

- 1.3.10 For each site, an inner study area includes the main development site and associated developments within the site boundary and land immediately beyond it to a distance of 500 metres (m) from the site boundary.
- 1.3.11 The size of the inner study area takes into account the transport of potential contaminants of concern in the environment and the connectivity of these contaminants via pathways of migration or exposure to the receptors and resources identified.
- 1.3.12 The general methodology adopted for the consideration of effects on groundwater and surface water levels and flows, and water dependent receptors and resources extends beyond this inner study area to a distance of 1 kilometre (km) from the site boundary. This is termed the outer study area.
- 1.3.13 The size of the outer study area allows for any potential physical changes resulting from the Sizewell C Project that may propagate through the water environment and beyond the inner study area to be assessed.

d) Assessment scenarios

- 1.3.14 The assessment of effects on the groundwater and surface water receptors includes the assessment of both the construction phase, and operational phase for the Sizewell C Project, and where relevant, the removal of and reinstatement phase, rather than the assessment of any specific peak years.

e) Assessment criteria

1.3.15 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any receptors or resources. Assessments broadly consider the magnitude of impacts and value/sensitivity of receptors/resources that could be affected in order to classify effects.

1.3.16 A summary of the assessment criteria used in the groundwater and surface water assessment is presented in the following sub-sections.

i. Assessment of physical impacts

1.3.17 Physical impacts include:

- changes or alterations to water levels and flow regimes of groundwater and surface water receptors and resources; and
- changes to habitat with associated groundwater and surface water receptors and resources.

1.3.18 The assessment criteria of physical impacts on groundwater and surface water receptors and resources are summarised in the following sub-sections.

ii. Sensitivity

1.3.19 The criteria used in groundwater and surface water assessment for determining the sensitivity of receptors and resources are set out in **Table 1.3**.

Table 1.3: Assessment of the value or sensitivity of receptors and resources for groundwater and surface water

Value or Sensitivity	Description
High	An attribute with a high quality/rarity, international or national significance that has a low capacity to accommodate disturbance or change.
Medium	An attribute with high quality/rarity, national scale and some resilience to disturbance or change. An attribute with high quality/rarity, at a regional scale that has a low capacity to accommodate disturbance or change. An attribute with medium quality/rarity, national scale that has a low capacity to accommodate disturbance or change.
Low	An attribute with medium quality/rarity, national or regional scale and some resilience to disturbance or change.

Value or Sensitivity	Description
	An attribute with low quality/rarity, national or regional scale and some resilience to disturbance or change.
Very Low	An attribute with low quality/rarity, regional and local scale and resilience to disturbance or change.

iii. Magnitude

- 1.3.20 The magnitude of impact is based on the likely level of change and is independent of the importance of the feature. The criteria used for the assessment of magnitude are set out in **Table 1.4**.

Table 1.4: Assessment of magnitude of impact on for groundwater and surface water

Magnitude	Criteria
High	Large-scale permanent/irreversible, or long-term temporary, changes over the whole development area and potentially beyond (i.e. off-site), to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	Medium-scale permanent/irreversible, or medium-term temporary, changes over the majority of the development area and potentially beyond, to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Low	Noticeable but small-scale change, permanent or temporary changes over a partial area, to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Very Low	Noticeable, but very small-scale change, or barely discernible changes for any length of time, over a small area, to key characteristics or features of the particular environmental aspect's character or distinctiveness.

- 1.3.21 Where the assessment of potential impact concludes that through careful design and the application of appropriate mitigation, there will be no discernible change (no impact) to a receptor or resource, then a conclusion of no effect is drawn.
- 1.3.22 Given the timescales of the Sizewell C Project, the definitions of temporary impacts are categorised as follows:
- short-term: less than six months;
 - medium-term: between six months and six years; and
 - long-term: more than six years.

iv. Effect definitions

- 1.3.23 The classification of the likely effect on groundwater and surface water was determined using the matrix presented in **Table 1.5** which describes the relationship between the value/sensitivity of the receptor and the magnitude of the impact.

Table 1.5: Classification of effects

		Value / Sensitivity of receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

- 1.3.24 An effect can be 'adverse' or 'beneficial' depending on the nature of impact on the quality and integrity on the receptor or resource. For example, an adverse effect would be where there would be a loss or damage to the quality or integrity of an attribute, whereas a beneficial effect would arise from the creation of a new or an improvement to an attribute.
- 1.3.25 Following the classification of an effect as presented in **Table 1.5**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

v. Assessment of contamination to controlled waters

- 1.3.26 The assessment of potential impacts from existing and new contamination sources on controlled waters has been considered as part of the geology and land quality assessment in the production of the preliminary conceptual site models to determine and classify potential effects.
- 1.3.27 Further details on the criteria and methodology applied is provided in **Appendix 6N** of this chapter.

vi. Water Framework Directive Compliance Assessment

- 1.3.28 WFD impacts are assessed differently to the approach conventionally used within the EIA process and require an assessment of whether a project (or an element of a project) is compliant or non-compliant with the environmental objectives outlined in Article 4 of the WFD.

- 1.3.29 The significance of effects on WFD status relates only to compliance or non-compliance. Non-compliance will only occur because of permanent impacts that cannot be mitigated, irrespective of the degree of vulnerability to change of the receptor. The assessment in this context will be restricted to either compliance or non-compliance.
- 1.3.30 The site-specific **WFD Compliance Assessments** have been provided as separate documents submitted as part of this application for development consent (Doc Ref. 8.14). The main conclusions with relevance to the activities considered as part of the EIA are summarised in the relevant groundwater and surface water chapters within **Volumes 2 to 9** of the **ES**.

vii. [Flood risk assessment](#)

- 1.3.31 Site-specific FRAs have been provided as separate documents submitted as part of this application for development consent (Doc Ref. 5.2 to 5.9). The main conclusions from the FRA's with relevance to the potential flood sources affecting the Sizewell C Project and the impacts that the Sizewell C Project would have on altering the flood risk levels relating to the surrounding surface water receptors will be summarised in each site-specific groundwater and surface water chapters, provided in **Volume 2, Chapter 19**; and **Volumes 3 to 9, Chapter 12** of the **ES**.

f) [Assessment methodology](#)

- 1.3.32 This section details the approach to the assessment of impacts specifically relating to groundwater and surface water.

i. [General approach](#)

- 1.3.33 The approach to the groundwater and surface water assessment comprises:
- establishing the baseline conditions for the study area with respect to geology, hydrology, hydrogeology, and historical uses;
 - identification of potential impacts on identified water dependent receptors and resources from the construction, operation and removal and reinstatement phases of the Sizewell C Project;
 - assessment of the significance of likely effects from the Sizewell C Project including the consideration of primary and tertiary mitigation measures; and
 - identification of any secondary mitigation, where required, and residual effects.

- 1.3.34 The assessments also consider the findings of the **WFD Compliance Assessment** (Doc Ref. 8.14) and the site specific **FRAs** (Doc Ref. 5.2 to 5.9).

ii. Establishing the baseline

Existing baseline

- 1.3.35 Existing baseline conditions are defined based on available published and site-specific information.

- 1.3.36 The baseline assessment relied on existing data, previous desk study and ground investigation reports, groundwater and surface water monitoring data and historical records. The following publicly available information sources were reviewed:

- publicly available information from the British Geological Survey online mapping resource (Ref. 1.37);
- publicly available information from the Environment Agency (Ref. 1.38 and Ref. 1.39); and
- publicly available information from the Defra's Multi-Agency Geographic Information for the Countryside website (Ref. 1.40).

Future baseline

- 1.3.37 The future baseline is typically established upon extrapolating the current baseline using technical knowledge of changes (e.g. changes in rainfall over time) and future climate forecasts to predict the environmental conditions at a future point in time. The groundwater and surface water chapters within **Volumes 2 to 9** of the **ES** have presented the future baseline where it is considered likely that the baseline would change over the course of the period identified for the construction and operation of the proposed development, in the absence of the Sizewell C Project.

- 1.3.38 Over the medium and long term, groundwater and surface water in the study area may be affected by climate change. There are a number of models covering the UK which simulate the change in climate. The UK Climate Impact Programme indicates that in the future winters may be generally wetter and summers substantially drier for the whole of the UK.

- 1.3.39 The direct effect of climate change on groundwater and surface water depends primarily upon the change in the intensity, volume and seasonal distribution of rainfall. Climate scenarios have been included in the groundwater and flood risk modelling that has been completed for the Sizewell C Project.

- 1.3.40 The effects of sea-level rise on the integrity of the existing coastal defences and long-term hydrological changes have not been directly modelled or assessed. They are presented in the relevant Shoreline Management Plan (Lowestoft Ness to Felixstowe Languard Point) (Ref. 1.41) which has a policy of ‘hold the line’ for the shoreline immediately adjacent to the existing power stations and proposed power station, with a specific objective ‘to maintain the location and safe operation of Sizewell power station and any future development of the site’. By contrast, the shoreline to the north extending beyond Minsmere Sluice has a policy of ‘managed realignment’.
- 1.3.41 A coupled groundwater-surface water transient numerical model has been developed and calibrated to pre-development baseline conditions. The model is well calibrated to extensive recent field monitoring data. The construction phase has been parameterised and represented in the numerical model to allow the change to the water environment to be predicted. The change in water levels and flows predicted by the model allow the impact of the construction phase to be established and assessed.
- 1.3.42 The preliminary conceptual site model presented in the geology and land quality assessment, provided in **Volume 2, Chapter 18** and **Volumes 3 to 9, Chapter 11** of the **ES**, has been used as the basis for determining and classifying potential effects on water quality.
- iii. **Assessment of construction, operation and removal and reinstatement (where applicable) phases**
- 1.3.43 The methodology applied to the assessments of the Sizewell C Project has been described under the assessment criteria section, and considers the assessment of physical impacts on receptors and contamination of ground and surface water waters. Further details on site-specific methodologies are provided in the site-specific groundwater and surface water chapters, provided in **Volume 2, Chapter 19**; and **Volumes 3 to 9, Chapter 12** of the **ES**.
- 1.3.44 Potential changes to the water environment in terms of water levels, flow and quality are considered qualitatively against baseline conditions in a preliminary assessment. Where a significant effect was identified at the end of this qualitative assessment, a more detailed quantitative appraisal of potential impacts on water levels and flow has been undertaken to determine the magnitude and extent of potential changes.
- 1.3.45 The approach to the groundwater and surface water assessment comprises:
- establishing the baseline conditions for the study area with respect to geology, hydrology, hydrogeology, and water dependent resources and receptors;

- identification of potential impacts on identified resources and receptors from this phase of the proposed development;
- assessment of the significance of likely effects from the proposed development including the consideration of mitigation measures; and
- identification of any residual effects and secondary mitigation where required.

iv. Inter-relationships

1.3.46 The assessment of contamination on groundwater and surface water receptors has been assessed and the findings reported within **Volume 2, Chapter 19** and **Volumes 3 to 9, Chapter 12** of the **ES**.

g) Assumptions and limitations

1.3.47 The following assumptions have been made in this assessment:

- surface water discharge will be managed so it does not exceed the pre-determined greenfield run-off rates in accordance with relevant guidance; and
- Environmental Quality Standards prescribed for downstream designated WFD water bodies have been adopted for upstream watercourses for the purposes of the assessments.

1.3.48 The following limitation has been identified:

- No ground investigation has been carried out at the associated development sites at the time of writing. Therefore, no observed information about the ground conditions at the sites or encountered groundwater was available to inform the assessments. The assessment has therefore been based upon published data.

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VOLUME 1, CHAPTER 6, APPENDIX 6P: COASTAL GEOMORPHOLOGY AND HYDRODYNAMICS LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1. Coastal Geomorphology and Hydrodynamics Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects of the Sizewell C Project on coastal geomorphology and hydrodynamics.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in the following Environmental Statement (**ES**) chapter and documents submitted with the application for development consent:

- **Volume 2, Chapter 20** of the **ES** (Doc Ref. 6.3);
- **Sizewell C Water Framework Directive (WFD)** (Doc Ref. 8.14); and
- **Habitats Regulations Assessment (HRA)** (Doc Ref. 5.10) marine assessments.

1.1.3 The coastal geomorphology and hydrodynamics assessments do not rely on methods or scenarios developed for other topics. However, some of the scenarios and assessment of impacts developed here are carried forward as the basis for further ecological impact assessment in **Volume 2, Chapter 22** of the **ES** and for climate change resilience and in-combination climate impacts presented in **Volume 2, Chapter 26** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant coastal geomorphology and hydrodynamics effects associated with the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the coastal geomorphology and hydrodynamics assessment as it has influenced the identification and categorisation of sensitive receptors, requirements for mitigation or the scope and/or method of assessment.

a) [International legislation](#)

i. [Habitats Directive](#)

- 1.2.3 The European Council Directive 92/43/ECC on the Conservation of natural habitats and of wild fauna and flora was brought into force in 1992. Known as the Habitats Directive, this key piece of legislation ensures that EU member states fulfil the obligations of the Bern Convention with the aim of restoring natural habitats and maintaining biodiversity. Favourable Conservation Status of wild species and habitats listed on the Annexes of the Directive are afforded stringent protection. In summary, the Habitats Directive requires member states to adopt an ecologically coherent network of protected sites for habitats and species listed in Annex I and Annex II of the Directive, respectively. Special Areas of Conservation (SACs) are designated and used in conjunction with Special Protection Areas (SPAs, refer to Birds Directive below) to form a network of Natura 2000 sites. The Habitats Directive requires member states to provide strict protection to species listed in Annex IV of the Directive and management measures are implemented to protect species listed in Annex V of the Directive to prevent exploitation or disturbance. Surveillance of protected habitats and species listed in the Directive is required. The Habitats Directive was transposed into the UK law through the Conservation of Habitats and Species Regulations 2010, which have been repealed and replaced by the 2017 Regulations (Ref. 1.1), and has effect within 12 nautical miles of the UK coast.

ii. [Birds Directive](#)

- 1.2.4 The conservation and management of wild bird populations across Europe is underpinned by Directive 2009/147/EC, on the conservation of wild birds (the Birds Directive). The Birds Directive (Ref. 1.2) is the means by which the UK and European Union meet the objectives of the Bonn Convention on migratory species and wild animals and the Bern Convention on conservation of European wildlife and natural habitats. Vulnerable and rare species listed on Annex I are afforded protection under the Natura 2000 network of protected areas through designated SPAs. Migratory species and internationally important wetlands are also protected with SPA designations.

iii. [Ramsar Convention](#)

- 1.2.5 The Ramsar Convention on the conservation of wetlands (Ref. 1.3) was agreed in 1971 and was ratified into UK law in 1976. Wetlands of

international importance are designated Ramsar sites and are afforded the same level of protection as SPAs under the Birds Directive.

b) National Legislation

i. Wildlife and Countryside Act 1981

- 1.2.6** The Wildlife and Countryside Act 1981 (as amended) was implemented to meet the obligations of the Bern Convention and Birds Directive. It also consolidated existing national legislation. It is the legal framework for designating Sites of Special Scientific Interest (SSSI). The 1981 Act (Ref. 1.4) makes it an offence to kill, injure or take any species listed under Schedule 5, including all cetaceans, and prohibits intentionally disturbing animals occupying places used for protection or shelter.

ii. Marine and Coastal Access Act 2009

- 1.2.7** The Marine and Coastal Access Act 2009 (Ref. 1.5) introduced new planning and management systems for overseeing the marine environment, most notably through the requirement to obtain marine licences for works at sea (including the deposition or removal of any substance or object from the sea below mean high water spring (MHWS) tide). It created a strategic marine planning system that seeks to promote the efficient, sustainable use and protection of the marine environment, guided by the Marine Policy Statement and a series of Marine Plans. The Act seeks to implement a series of Marine Conservation Zones (MCZ), to sit alongside European Marine Sites (SACs/SPAs), SSSIs and Ramsar sites to form an ecologically coherent network of marine protected areas.

- 1.2.8** The Marine and Coastal Access Act 2009 provides the framework for a marine licensing system, which is administered by the Marine Management Organisation (MMO), a statutory consultee within the Development Consent Order (DCO) application process.

iii. Conservation of Habitats and Species Regulations 2017

- 1.2.9** The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations, Ref. 1.1) provide the legislative enforcement for the protection of Natura 2000 sites within the limit of territorial waters (12 nautical miles) under the Habitats Directive and protect species and habitats listed in Annex I and II. The 2017 Regulations make it an offence to deliberately capture, kill, disturb or trade any European Protected Species (EPS) listed in

Schedule 2, including all cetaceans. When activities have the potential to contravene EPS, the Regulations specific licences may be granted allowing the activities to proceed.

c) Policy

i. National Policy Statements

- 1.2.10 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.6) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.7). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts. In addition, the application must also have regard to the UK Marine Policy Statement 2011 (Ref. 1.8).

- 1.2.11 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account in **Chapter 20** of the **ES** is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

	NPS topic requirement.	How the requirement has been addressed.
EN-1 5.3.3	<i>“Where the development is subject to Environmental Impact Assessment (EIA) the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.”</i>	Effects on designated sites arising from changes to coastal geomorphology and hydrodynamics as a result of the proposed development are identified in Volume 2, Chapter 20 of the ES and further assessed in Volume 2, Chapter 22 of the ES .
EN-1 5.3.4	<i>“The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.”</i>	Opportunities to conserve and enhance biodiversity conservation interests associated with the marine environment are described in Volume 2, Chapter 22 of the ES . These include embedded mitigation, such as the Soft Coastal Defence Feature (SCDF) and Hard Coastal Defence Feature (HCDF).
EN-1 5.5.7	<i>“Applicants should assess the impact of the proposed project on coastal processes and geomorphology, including by taking account of potential impacts from climate change. If the development will have an impact on coastal processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast.”</i>	Volume 2, Chapter 20 of the ES identifies potential impacts on coastal change. Impacts are minimised through the proposed design of coastal defences (embedded mitigation) and, if required, beach management activities.
EN-1	<i>“Applicants should assess the implications of the proposed project on strategies for managing the coast as set out in</i>	There are no implications for the Suffolk SMP, as the frontage of the existing Sizewell power station complex is already designated as ‘Hold The Line’,

	NPS topic requirement.	How the requirement has been addressed.
	<i>Shoreline Management Plans (SMPs)</i>	which allows management activities for the prevention of coastal erosion. Combined hard and soft coastal defence measures embedded within the proposed development are in line with the SMP. Impacts are considered against the different SMP designations along the Suffolk coastline.
EN-6 3.8.3	Applicants should “ <i>assess the site’s ... ongoing natural ecological, coastal and geomorphic processes. This will include identifying impacts on coastal processes, intertidal deposition and soil development processes that maintain terrestrial/coastal and/or marine habitats.</i> ” Also, “ <i>assess baseline coastal geomorphology</i> ” and “ <i>Identify impacts that maintain coastal marine habitats.</i> ”	Volume 2, Chapter 20 of the ES presents a summary of baseline assessment for coastal geomorphology. Detailed description of geomorphic processes and impacts are given in Technical Appendix 20A of Volume 2 of the ES and associated feeder reports. The long-term effect of an exposed HCDF would increase the longevity of local vegetated shingle habitats to the north of Sizewell C Project.
EN-6 3.8.5	Applicants should take into account “ <i>the effects of climate change over the lifetime of the project (including any decommissioning period)</i> ” and “ <i>... include measures where necessary to mitigate the effects of, and on, coastal change.</i> ”	Volume 2, Chapter 20 of the ES outlines the proposed mitigation measures which take into account climate change over the lifetime of the proposed development. A further climate change resilience assessment and in-combination climate impacts assessment is presented in Volume 2, Chapter 26 of the ES . A high-level description of the anticipated activities for the decommissioning of the Sizewell C power station, including a summary of the types of environmental effects likely to occur is provided in Chapter 5 of Volume 2 of the ES . As discussed in Chapter 5 of Volume 2 of the ES , for the decommissioning of the proposed development, it is necessary to obtain prior consent from the Office for Nuclear Regulation and undertake a separate EIA at the time of submission.

ii. Marine Policy Statement

- 1.2.12 The UK Marine Policy Statement (Ref. 1.8) is the framework for preparing Marine Plans and sets out the environmental, social and economic considerations for decisions affecting the marine environment. The relevant section of the Policy Statement (Section 2.6.8, pertaining to coastal change and flooding) indicates that any development which may affect areas at high risk and probability of coastal change should not be considered unless the impacts upon it can be managed. Developers should also seek to minimise or mitigate changes in geomorphology and coastal process (including sediment movement). **Volume 2, Chapter 20** of the **ES** therefore identifies plausible mitigation for all potentially non-negligible effects on marine geomorphology receptors.

d) Regional

i. East Inshore Marine Plan

- 1.2.13 The East Inshore Plan (Ref. 1.9) is a means of holistic management to deliver the vision of ‘clean, healthy, safe, productive and biologically diverse oceans and seas’, under the Marine and Coastal Access Act 2009. The East Inshore Marine Plan area extends from Flamborough Head in the north to Felixstowe in the south with a seaward limit stretching 12 nautical miles offshore. The MMO is responsible for the East Inshore Marine Plan, overseeing the area’s resources and the activities and interactions that take place within them, to provide Integrated Coastal Zone Management and sustainable development.

ii. Suffolk Shoreline Management Plan (SMP7, Policy Development Zone 4: Dunwich Cliffs to Thorpeness)

- 1.2.14 SMPs are applied to individual sediment cells along the coast for the purpose of managing flood and erosion risk during the short, medium and long term. They identify the best ways to manage coastal flood and erosion risk to people and the developed, historic and natural environment.
- 1.2.15 The SMP for Zone 4, Dunwich Cliffs to Thorpeness (Ref. 1.10), is primarily focussed on allowing the coast to function naturally as far as possible. The long-term result of this will be increased marine incursion to the Minsmere Valley.
- 1.2.16 The Greater Sizewell Bay (GSB) features all SMP classifications – *Hold The Line*, *Managed Realignment* and *No Active Intervention* – at all timescales

(referred to as epochs). Local management activities (e.g. construction of the north wall on the northern side of the RSPB Minsmere site) occur within the managed realignment frontage.

- 1.2.17 The Sizewell power station's frontage is *Hold The Line* (for all three epochs). Erosion rates around Sizewell's *Hold The Line* frontage are low, however patches of persistent erosion occur between the Sizewell C site and the Minsmere Outfall, and between the Minsmere Outfall and the Dunwich Cliffs.

e) Local

- 1.2.18 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.19 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

- 1.2.20 The adopted Suffolk Coastal Local Plan (Ref. 1.11) comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations (2001 and 2006; the Core Strategy and Development Policies Development Plan Document (2013; Ref. 1.12); and the Site Allocations and Area Specific Policies Development Plan Document (2017; Ref. 1.13).

- 1.2.21 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019; Ref. 1.14) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. Suffolk Coastal District Local Plan (July 2013)

- 1.2.22 As outlined in **Volume 1 Chapter 3** of the **ES**, the Suffolk Coastal District Local Plan (Ref. 1.11) Strategic Policy SP13, Nuclear Energy, dealing specifically with Sizewell C lists issues to be adequately addressed and considered by the local authority in the Local Impact Report including coastal erosion and coastal protection issues, coastal access, and ecological impacts on nearby designated sites. Though access and ecology in particular are not addressed directly as receptors, impacts to coastal geomorphology

which could affect these issues are identified and assessed in the coastal geomorphology and hydrodynamics **ES** chapter (**Chapter 20** of **Volume 2**).

ii. [Suffolk Coastal Final Draft Local Plan January 2019](#)

- 1.2.23 Though not yet adopted, the draft updated Local Plan (Ref. 1.14) indicates that the Council will assess Major Energy Infrastructure Projects for robust EIA, and for the consideration of appropriate flood and coastal defences over construction, operation and decommissioning phases (including climate change provision). The Plan also indicates that the Council will examine monitoring proposals to ensure that proposed mitigation remains effective and relevant.

f) [Guidance](#)

- 1.2.24 Coastal Geomorphology and Hydrodynamics data underpin many of the Marine Ecology assessments. Therefore, the same EIA methods have been adopted between marine disciplines, based on the established Marine Evidence-Based Sensitivity Assessments methodology (Ref. 1.15). The method assesses the predicted amount of change for a given impact against standardised benchmarks. In accordance with Chartered Institute of Ecology and Environmental Management Ecological Impact Assessment (EcIA) guidelines (Ref. 1.16) impact magnitude is defined primarily on the basis of its spatial extent, duration and the amount of change (positive or negative) relative to baseline conditions; where significant, additional factors such as frequency, timing and reversibility of the impact are considered and reported where these affect the sensitivity of receptors. EcIA guidelines will be taken into account where appropriate as these factors can contribute towards the sensitivity of a receptor to an impact.

1.3 [Methodology](#)

a) [Scope of the assessment](#)

- 1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 This section provides a summary of the coastal geomorphology and hydrodynamics assessment methodology. The scope of assessment considers the impacts of the construction and operation of the proposed main

development site (no other aspects of the Sizewell C Project affect marine geomorphology or hydrodynamics).

- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.4 Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5 Thermal plumes are not assessed because there is no pathway to impact upon geomorphic receptors. The plume trajectory is upward, and the plume is buoyant, meaning that thermal changes occur in the water column and at the surface, distant from geomorphic receptors. The thermally mixed plume would have degraded substantially before it can interact with the bed some kilometres downstream. Furthermore, sediment transport, and therefore geomorphic change, is insensitive to the range of temperature changes that can be induced as a result of thermal plumes.

b) Consultation

- 1.3.6 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. To facilitate engagement with statutory (and non-statutory) stakeholders on the marine assessments, the Sizewell Marine Technical Forum was established on 26th March 2014. The Marine Technical Forum has an independent chair, supported by a technical secretariat supplied by SZC Co. together with nominated technical representatives from Natural England, the Environment Agency, the Marine Management Organisation, and the Coastal Authority (East Suffolk Council), and any consultants working on their behalf. Additional participation is encouraged with the agreement of Marine Technical Forum members when specific issues are being discussed. The Royal Society for Protection of Birds also attended a Marine Technical Forum meeting in March 2019.
- 1.3.7 The key aim of the Marine Technical Forum is to provide a means whereby the evidence base – the nature of the marine monitoring at Sizewell, the results (including impact prediction) and their outcomes – can be readily discussed, seeking agreement or consensus between SZC Co. and the

statutory environmental bodies, and clarity on any points of difference. A summary of the general comments raised by the Marine Technical Forum and SZC Co.'s responses are detailed in **Table 1.2**.

1.3.8 In advance of the DCO, the Sizewell C Marine Technical Forum has sought to develop a shared understanding of the status and sufficiency of the marine studies advanced by SZC Co., the assessments of project impact based upon these studies and the proposed means of mitigation, in order both to facilitate advice given by its members to the Planning Inspectorate and inform their own procedures. The aim in this context has been to assist both in the development of statements of common ground between SZC Co. and the statutory environmental bodies and the formulation of requirements for consideration by the Planning Inspectorate.

1.3.9 Two rounds of comments totalling over 300 separate enquiries were received from the Marine Technical Forum during informal consultations on 12 July 2016 and 28 March 2019, summarised in **Table 1.2** below. These are addressed in the Coastal Geomorphology and Hydrodynamics ES chapter (**Volume 2 Chapter 20** of the **ES**) and more specifically in **Appendix 20A** of **Volume 2** of the **ES**, which was compiled to address the specific queries raised with regard to modelling and technical reporting.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the coastal geomorphology and hydrodynamics assessment.

Consultee	Date	Summary of topic areas discussed.
Suffolk County District County	12 th July 2016 (Meeting)	<ul style="list-style-type: none"> • Future beach stability and at the BLF location. • Updates on offshore bathymetric change. • Modelling of future longshore transport and shoreline change with particular reference to Thorpeness. • How future scenarios for environmental change would be developed. • Details of model inputs and set-up. • Impacts from the intakes and outfalls particularly scour calculations. • Issues for flood risk assessment.
Environment Agency	12 th July 2016 (Meeting)	<ul style="list-style-type: none"> • Request detailed assessments of design options of coastal defence features and the potential coast protection function of the BLF.

Consultee	Date	Summary of topic areas discussed.
Natural England	12 th July 2016 (Meeting)	<ul style="list-style-type: none"> The potential for detrimental effects on the integrity of adjacent SSSI and SAC shorelines.
Marine Management Organisation	12 th July 2016 (Meeting)	<ul style="list-style-type: none"> Areas affected by suspended sediment and deposition due to dredging and other plumes. Methods of dune construction. Scale of future beach erosion affecting designated sites. Methods for future shoreline change projection and modelling. Detailed comments on scour, dredging and shoreline change modelling reports.
All consultees	27/28 th March 2019	<p>Uncertainty about the future projection of shoreline change and the reliance on expert assessment.</p> <p>Concern over incomplete design of the Coastal Defence Features (with particular reference to beach scour around the toe and potential exposure of the feature).</p> <p>Beach response to storms and the volume of a 'viable' beach.</p> <p>Rates and assessment of shingle transport.</p> <p>Design and planning of long-term monitoring, including the participation of Marine Technical Forum.</p>

c) Study area

1.3.10 The Zone of Influence (Zol) for the coastal geomorphology assessment has been defined in agreement with the Marine Technical Forum as the Greater Sizewell Bay (GSB) (see **Figure 20.1** in **Volume 2, Chapter 20** of the **ES** and **Figure 20A.57** in **Appendix 20A** of **Volume 2** of the **ES**).

1.3.11 The study area for coastal geomorphology extends from Walberswick in the north to the Coralline Crag formation at the apex of the Thorpeness headland in the south within the GSB. The seaward boundary extends to beyond the eastern flank of the Sizewell-Dunwich Bank and includes the proposed cooling water infrastructure on the east side on the bank, as shown in **Figure 20.1** in **Volume 2, Chapter 20** of the **ES**.

1.3.12 The Zol was based on the active sediment cell in the area. The landward limit of the marine environment is delineated by the standard Marine Management Organisation limit of present-day MHWS for the initial EIA.

However, the 2019 EIA Scoping Opinion (4.13.14), see **Appendix 6B** of this volume, suggested that this may not be sufficient: thus, the narrative assessment of future impacts in **Volume 2, Chapter 20** of the **ES** considers of the landward translation of the MHWS with rising sea levels and shoreline erosion. This includes effects on future geomorphic features that would be landward of the present MHWS and geomorphic features influences by coastal processes that are above or landward of MHWS, such as supra-tidal shingle which is affected by infrequent storm events and/or high water levels).

d) **Assessment scenarios**

- 1.3.13 The assessment of individual project design features and activities has been presented separately over construction and operational phases. Subsequently, the potential for the effects of individual project features and activities to combine and result in significant inter-relationship effects is considered. These are detailed further in **Volume 2, Chapter 20** of the **ES**.
- 1.3.14 Ongoing shoreline recession in the absence of mitigation is expected to expose the proposed HCDF during the approximate time window of 2053 – 2087. This would constitute a future shoreline baseline, which in combination with the proposed development may result in new impacts to coastal geomorphology receptors. This future baseline scenario is considered separately in the coastal geomorphology and hydrodynamics assessment.

e) **Assessment criteria**

- 1.3.15 As described in **Volume 1, Chapter 6** of the **ES** the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and sensitivity of receptors that could be affected in order to classify effects.
- 1.3.16 A summary of the assessment criteria used in the coastal geomorphology and hydrodynamics assessment is presented in the following sub-sections.

i. **Coastal geomorphology receptors**

- 1.3.17 The coastal geomorphology receptor of the GSB has five morphological elements (see **Figure 20.1** in **Volume 2, Chapter 20** of the **ES**), which may interact directly or indirectly with one another:

- the shoreline/beach (which encompasses sections fronting the Minsmere to Walberswick Heaths and Marshes SAC and the Minsmere to Walberswick SPA), containing UK priority Biodiversity Action Plan's Coastal Vegetated Shingle Habitat (Annual vegetation of drift lines, Annex I habitat 1210) and the potential for nesting Little Terns;
- two (inner and outer) longshore bars;
- the Sizewell – Dunwich Sandbank; and
- the Coralline Crag outcrops (at Thorpeness and seaward of the Sizewell-Dunwich bank).

1.3.18 Effects on the geomorphic receptor elements would occur either directly (such as dredging the sea floor) or indirectly, e.g. the presence of piles altering the flow regime and causing bed lowering (scour). In addition to direct pressures, the assessment considers how the indirect pressures (such as changes to hydrodynamics, sediment suspension or substrate disturbance) affect different geomorphic receptors (the beach, bars, bank or crag). Both direct and indirect pressures affect sediment transport, which in turn determines sedimentation and the geomorphic response.

ii. Receptor sensitivity

1.3.19 The sensitivity assessment applied in **Volume 2, Chapter 20** of the **ES** is based on the Marine Evidence based Sensitivity Assessment approach (Ref. 1.11) to establish a pressure-feature sensitivity matrix to support the UK MCZ management.

1.3.20 For consistency **Volume 2, Chapter 21** and **Chapter 22** of the **ES** (Marine Water Quality and Marine Ecology), which are partly dependent on assessments of physical process impacts, the Marine Evidence-Based Sensitivity Assessments pressure-sensitivity framework has been applied to the assessment of the geomorphic receptors. However, the Marine Evidence-Based Sensitivity Assessments approach has been designed primarily with benthic habitats and fauna as receptors and there is no accepted variant model for the assessment of geomorphic receptors. The coastal geomorphology assessment is carried out by modifying the Marine Evidence-Based Sensitivity Assessments benchmarks, so that they appropriately characterize pressures significant to geomorphic receptors, rather than to benthic species i.e, benchmark levels likely to signify material changes to the geomorphic receptor.

Resistance and resilience

- 1.3.21** Sensitivity is a measure of a receptor's resistance and resilience to a given pressure. Resistance determines the receptor's susceptibility to (or tolerance of) a pressure, whilst resilience gives an indication of the ability to recover from a perturbation or stress. Assessment scales for resistance and resilience are provided in **Table 1.3**.
- 1.3.22** It should be noted that resilience and resistance scales are specific to each pressure-receptor combination. Therefore, for each receptor, specific assessments of resilience and resistance to a given pressure are implemented based on available evidence and expert judgement. Sensitivity scales are based on the observed (baseline) behaviour of the geomorphic elements, as detailed in **Section 1.4** and Technical **Appendix 20A** of **Volume 2** of the **ES**.
- 1.3.23** The defined values of resistance and resilience are combined to give an overall sensitivity score for each receptor-pressure combination according to the schedule provided in **Table 1.4**.

Table 1.3: Assessment scale for the resistance and resilience of geomorphic receptors to a given pressure.

Resistance	Description	Resilience	Description
None	Feature is easily altered – historic variability is high; presence of feature is not permanent. Pressure could result in complete loss of geomorphic function i.e. loss of beach; change or loss of longshore sediment transport pathway; loss of bars and/or bank.	Very Low	Negligible; or prolonged (greater than 25 years) recovery.
Low	Feature is highly variable and responds quickly to changes in hydrodynamic conditions – historic variability is high. Pressure could cause deviation in geomorphology that is beyond the measured range (decadal scale 1990-present).	Low	Full recovery within 10-25 years.
Medium	Feature is essentially permanent but varies within a defined range, largely	Medium	Full recovery in 2-10 years.

Resistance	Description	Resilience	Description
	unaffected by typical hydrodynamic conditions – historic variability is low. Pressure could change geomorphic features within the range of historical trends.		
High	Receptor is stable over a wide range of conditions – historic variability is low or negligible. Pressure could not conceivably result in significant changes to morphology or process.	High	Full recovery within 2 years.

Table 1.4: The sensitivity score based on the combined resilience and resistance scores.

	Resistance			
Resilience	None	Low	Medium	High
Very Low	High	High	Medium	Low
Low	High	High	Medium	Low
Medium	Medium	Medium	Medium	Low
High	Medium	Low	Low	Very Low

iii. Impact magnitude

1.3.24 Impact magnitude is characterised as the combination of three separate components: the duration, spatial extent and amount of change introduced by the impact. The criteria used for assessing impact magnitude are shown in **Table 1.5**. Since magnitude scales are not defined for geomorphic assessment in UK guidance, the magnitude scales are based upon the observed (baseline) behaviour of the geomorphic elements, as detailed in Technical **Appendix 20A** of **Volume 2** of the **ES**. In some cases, the likelihood of the impact occurring, and the reversibility of the impact are also considered, and reported where these factors may affect the assessment of the impact magnitude.

1.3.25 The combination of these components into a single indicator of magnitude is an undefined process, so requires an element of expert judgement, e.g., whether the magnitude is defined by the highest single factor or (more reasonably, but less clearly) by some combination.

1.3.26 The criteria for the assessment of impact magnitude are shown in **Table 1.5**.

Table 1.5: Definitions for the assessment of impact magnitude

Impact Magnitude	Description	Spatial Extent	Amount of Change	Duration
High	Large-scale changes to receptor over the zone of influence and potentially beyond.	Affecting whole area, possibly beyond.	Clear, measurable, beyond normal range of natural variability.	Long term temporary greater than 5 years.
Medium	Medium-scale changes to receptor over the majority of the zone of influence and potentially beyond.	Majority of receptor area, perhaps beyond.	Clear, measurable, within normal range.	Medium-term temporary 1-5 years.
Low	Noticeable but small-scale change to receptor over a partial area.	Partial area.	Slight change within normal range.	Short-term temporary, less than one year.
Very Low	Noticeable, but very small-scale change, or barely discernible changes to receptor, over a small area.	Small area of receptor.	Possibly unmeasurable / not easy to separate from natural change.	Spring-Neap cycle or less.

iv. Classification of effects

1.3.27 The significance of effects is determined by combining the impact magnitude and sensitivity assessments to determine an effect classification, using **Table 1.6**.

1.3.28 Minor and negligible effects are not considered to be significant. Moderate and major effects are considered significant.

1.3.29 The classification of effects is coupled to a descriptor outlined in **Table 1.7**, which can be used to confirm the overall conclusions of the assessment.

1.3.30 The assessment of effects for each activity includes an overall summary assessment table for the geomorphology receptor, which provides a quick visual representation of the assessed effect of the given activity on overall sedimentary processes. **Table 1.8** shows the assessment of effect significance for the presence of the proposed Beach Landing Facility (BLF) piles on the beach and inner bar during the operational phase as an example.

Table 1.6: Classification of effect based on sensitivity of receptors and magnitude of impact.

Magnitude of Impact	Sensitivity of Receptor			
	Very Low	Low	Medium	High
Very Low	Negligible	Negligible	Minor	Minor
Low	Negligible	Minor	Minor	Moderate
Medium	Minor	Minor	Moderate	Major
High	Minor	Moderate	Major	Major

Table 1.7: Description of effect classifications.

Effect	Description
Major	Effects, both adverse and beneficial, which are likely to be important considerations because they contribute to achieving national/regional objectives, or, which are likely to result in exceedance of statutory objectives and/or breaches of legislation. e.g. affecting viability as site for infrastructure
Moderate	Effects that are likely to be important considerations.
Minor	Effects that could be important considerations.
Negligible	An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

Table 1.8: Example table summarising the assessment of effect significance.

Effect: negligible, not significant				
Impact Magnitude: Very Low			Sensitivity: Low	
Duration	Extent	Change	Resistance	Resilience
<i>High</i>	<i>Very Low</i>	<i>Very Low</i>	<i>Medium</i>	<i>High</i>

1.3.31 In the example shown in **Table 1.8**, the impact magnitude is very low despite the high duration, because the amount of change in the sediment transport system caused by the sparse BLF piles is very low and affects only a very low extent of the affected receptors (the beach and inner bar), leading to a “negligible, not significant” effects classification.

v. Value

1.3.32 The notion of receptor value has been separated out from the original Marine Evidence-Based Sensitivity Assessments methodology, where it was used in

combination with sensitivity. The concept of value is applied where an impact affects a geomorphic receptor at a location with a higher value or importance, such that the same effect is of greater significance in one place than another.

1.3.33 Receptor value is determined on a four point scale, on the basis of key criteria defining (i) the ecological importance of the feature (for the structure or functioning of the environment), (ii) the socio-economic importance (for users, such as commercial fisheries, tourism or coastal access) and (iii) the conservation importance (contribution to the viability of designations):

- **High** – indicating (i) a major functional feature; (ii) international conservation value such as SACs, SPAs, Ramsar, SSSIs; and/or (iii) national/international socio-economic value
- **Medium** – indicating (i) supporting another feature; (ii) national conservation value such as designated features of regional or county importance; national/regional socio-economic value (e.g., commercial fishery).
- **Low** – indicating (i) limited connection to other ecosystem features; (ii) regional/local conservation value such as local nature reserves; (iii) local socio-economic value (e.g. artisanal fishery).
- **Very Low** – indicating (i) no dependent geomorphic features; (ii) no conservation designation; (iii) no immediate socio-economic function.

1.3.34 Effects judged as negligible or minor (based on a low magnitude due to a limited spatial footprint, for example) would be judged to be of greater importance if they affected a higher value location, such as a designated conservation site or feature. In that case, the same effect would be considered to be of greater significance. Receptor value is considered to increase with local, regional, national or international significance, and the extent to which the effect significance should be raised is determined by expert assessment. Further assessment, including assessment of mitigation options, would then be carried out when the effect is raised as a result of receptor value.

1.3.35 None of the assessments carried out identified impacts affecting a high value feature so this expert judgement process has not been applied in **Volume 2, Chapter 20** of the **ES**.

f) Assessment methodology

i. Establishing the baseline

1.3.36 The evidence base for each of the geomorphic receptor elements (baseline and predicted response to the marine activities and infrastructure associated with the proposed development) is contained in the geomorphology and hydrodynamics synthesis report (**Appendix 20A of Volume 2 of the ES**).

1.3.37 Methods used to establish environmental baselines include:

- desk-based literature studies of existing data and development studies extending back over several decades, and up to 150 years in the case of mapping and marine charts;
- in-situ data collection, including topographic surveys (RTK- GPS and drone photogrammetry), hydrographic measurements (via buoys and short-term instrument deployments in the nearshore), maritime bathymetry surveys, nearshore feature detection and tracking via radar and camera images; and
- computational modelling to establish representative regional forcing and environmental responses using established modelling platforms - of marine hydrodynamics and sediment transport (using Telemac, Tomawac, Artemis and Sisyphe), and beach profile change and shoreline evolution (using X-beach and UNIBEST).

ii. Assessment of effects

1.3.38 The impacts of the proposed development were assessed on the basis of the known design of the marine elements, to establish the scale, timing and location of interaction with the marine environment. Impacts were estimated where appropriate by using the same computational models developed for baseline studies, modified to include the development components or activities. Where modelling was not practicable or justified (for example, due to the scale of the expected impact or the lack of suitable modelling platform), expert assessment was used. Expert assessment was also required for the assessment of impacts against a future shoreline baseline, due to the inherent uncertainty in environmental conditions over the lifetime of the proposed development.

g) Assumptions and limitations

1.3.39 In several cases the principal limitation on the assessments is that the detailed design and method statements for marine construction and infrastructure are yet to be finalised, which limits the accuracy of predicted environmental impacts. Assumptions are therefore made to assess the likely worst-case impacts.

1.3.40 A summary of the limitations and assumptions made within the coastal geomorphology and hydrodynamics assessment is provided below.

i. General

1.3.41 Short-term works (e.g. piling, drilling, submarine installation of heads and the brief dredging for these works to take place) are assumed to be insufficient to cause long-term changes in their own right (though they are assessed and are also included in the inter-relationships and cumulative effects assessments, where impacts may be prolonged by superposition of subsequent activities).

1.3.42 Physical damage pressures such as substrate penetration and compaction (which could be considered geomorphic effects) are assessed as pressures in line with the Marine Evidence-Based Sensitivity Assessments methodology.

1.3.43 Wave and current flows are not defined as receptors, but as environmental variables and drivers of change to receptors, and therefore are not directly assessed for effects. Hydrodynamic pressures are quantified and the resultant change in forcing assessed to derive wave and current impacts on the geomorphology receptors.

1.3.44 Changes to suspended sediment as a result of the construction and operation of the proposed development are too small to affect geomorphology. However, the sources and sinks of suspended sediment may be of significance and these are considered alongside hydrodynamics under the blanket pressure ‘changes in sedimentation’, which encapsulates sediment transport and the potential for change in morphology.

ii. Hard coastal defence feature

1.3.45 The final design and detailed construction plans for the HCDF were not known at the time of assessment. Though considered unlikely, it has been

assumed as a worst case that heavy plant will be required to operate on the upper beach as part of the construction works.

iii. Beach landing facility

- 1.3.46 Use of a jack-up barge is considered the worst case for construction of the BLF as the cantilever method (installation from each previously assembled deck section) would have no separate impact apart from the piles themselves.
- 1.3.47 The dredging requirement (clearance) for vessel (barge and tugboats) access to the BLF is not currently known but is considered to be small (substantially less than 1m). The dredging requirement for the docked (grounded) barge has also not been finalised. Details of the assumptions made can be found in **Appendix 20A** of **Volume 2** of the **ES**.
- 1.3.48 A capital dredge, followed by maintenance dredges for long periods of use, has been assumed. Dredging for the BLF approach would also depend on the longshore bar morphology, specifically the bed elevation seaward of the BLF deck, for periods when the BLF would be in use. Wave climate data (for infilling of dredged areas) and the most recent bed elevation data have been used to assess the frequency of maintenance dredges.
- 1.3.49 Dredging would only be needed when the BLF approach is too shallow or the requirements for the barge grounding pocket (e.g. port – starboard slope tolerance) are not met. Dredging would also only be needed when the BLF is in use – due to navigational limitations this coincides with calm sea conditions, meaning the BLF usage, and therefore dredging, would be infrequent during November to March.
- 1.3.50 The probable working season is therefore likely to be April-October (inclusive) each year. There may be some occasions where calm winter weather is utilised for marine freight deliveries. Barges are also assumed to be present 50% of the time during the working season. Taken together, these assumptions would over-represent the required barge traffic over the construction period. However, as the seasonal sea conditions cannot be predicted in advance, the assessments conservatively assume maintenance of the approach channel and grounding pocket throughout the construction period of the proposed development.

iv. Nearshore outfalls

- 1.3.51 Dredged spoil will be disposed locally within the temporary disposal site as defined within the Marine Licence.
- 1.3.52 The assessments of scour are based on the assumption of a rectangular block and located on the seaward flank of the outer bar. This is considered to be a plausible worst case for both hydrodynamic and sediment transport pressures.
- 1.3.53 The extent (if any) of scour protection to be used is not known and associated secondary scour has not been assessed.

v. Offshore cooling water infrastructure

- 1.3.54 The extent (if any) of scour protection to be used is not known and associated secondary scour has not been assessed. However, secondary scour, though potentially scouring over a wider area depending on the extent of the scour protection, will reduce the volume of sediment scoured and will have no significant effect on any geomorphological receptor.

h) Project-wide inter-relationships assessment

- 1.3.55 This section details the definitions and stages, project marine components (building and using components) and methodology for the assessment of project-wide inter-relationships (see **Appendix 20A** of **Volume 2** of the **ES** for details) on geomorphology receptors.
- 1.3.56 Inter-relationship impacts may occur if two (or more) Sizewell C marine development components overlap in time and space.

i. Definitions

- The ZoI for the coastal geomorphology receptor is the Greater Sizewell Bay (see **Figure 20.1** of **Volume 2** of the **ES**).
- Inter-relationship impacts are impacts that would occur if two (or more) Sizewell C marine development components overlap in time and space.

ii. Sizewell C Project components

- 1.3.57 The inter-relationship effects assessment does not separate impacts according to the construction and operational phases of the Sizewell C

Project, because effects may overlap this temporal boundary. Instead, the marine components of the Sizewell C Project have been split into ‘building’ and ‘using’ stages (i.e., some elements of the development, such as the BLF, are both built and then used during the construction phase), with different pressures and impacts associated with each stage. The pressures associated with each component for its build and use phases are summarised in **Appendix 20A of Volume 2 of the ES**.

iii. **Spatio-temporal combinations of individual Sizewell C impacts (inter-relationships)**

- 1.3.58 The schedule for the inter-relationships assessment is shown in Table 28 of Technical **Appendix 20A of Volume 2 of the ES**. The assessment for coastal geomorphology receptors is undertaken in three stages, as follows.
- 1.3.59 Firstly, inter-relationship impacts are clustered into temporal combinations of building marine components and using marine components (see **Table 1.9**).
- 1.3.60 Secondly, the spatial overlaps of components for each temporal combination are identified, as shown in Figures 57 and 58 of **Appendix 20A of Volume 2 of the ES**.
- 1.3.61 Finally, qualitative assessment of the impacts of all identified spatially and temporally overlapping combinations is undertaken. Quantitative assessment is generally not possible; either because there is no standard technique or theoretical basis for quantifying the combined outcome of different impacts, or because modelling of combined impacts is not available. As a result, it is not possible to apply the same quantitative assessment categories as were used for the individual component assessments. However, a judgement on the significance of inter-relationships has been made on the basis of the qualitative assessment.
- 1.3.62 The assessments therefore apply the following categories of interactions:
- Subtractive: interactions that result from spatially and temporally coincident impacts that act counter to one another, thereby lessening the combined impact.
 - Additive: interactions that result from spatially and temporally coincident impacts that act together, thereby increasing the combined impact.

- Neutral: interactions that have no or negligible effects even when combined, or which balance out.
- Implausible: where no interaction is likely between two activities having a spatial overlap within the temporal combination, generally because of sequencing. For example, the presence of scour pits around the BLF piles cannot interact with the insertion of the piles, as scour pits cannot form before the piles are inserted. Such interactions are therefore scoped out of the assessment.

iv. Assumptions and limitations

1.3.63 To reach qualitative conclusions for the inter-relationship effects, the following assumptions and limitations were made:

- Within each temporal combination, all impacts are conservatively assumed to be continuously occurring.
- The timeline of the proposed development is shown in **Table 1.9** and is used to determine the potential for temporal overlap of development activities. Whilst the development timeline could be subject to variation, the assessed inter-relationship effects from the proposed development are not anticipated to change significantly, if timelines shift by the order of years.
- If a combination of marine components generates a combination of additive, neutral or subtractive interactions amongst different pressures, then additive is selected to ensure the potential worst case is considered. For example, where neutral interaction is expected in terms of hydrological change, but additive interaction may occur in terms of physical damage, the combination is classified as additive.
- The project schedule used to identify within-project interactions is conservative, as substantially longer durations are set for assessment purposes than would occur in practice. For example, the construction of the BLF and the cooling water infrastructure would occur over a three year period and are assumed to be continuously occurring during that period, however individual marine components would only take a fraction of that time interval – the insertion of marine piles would only take six months of the three year interval, for example. The impact

duration is also added to the activity duration, further extending the duration associated with each activity in the project schedule.

- During the seven-month operational window, assessments consider a single initial maintenance dredge event followed by smaller monthly maintenance dredges of the berthing pocket and outer bar. Sedimentation thicknesses greater than 20mm from plumes are considered significant for coastal geomorphology.
- Worst-case scour for all structures has been calculated assuming no scour protection, but the change in impact when using scour protection (which gives a larger areal extent) has also been considered.
- Spatial buffers are applied where the extent of an activity (and associated impact):
 - A 100m buffer is used for anchoring at the nearshore and offshore intakes and outfalls.
 - A 50m buffer is used for anchoring and vehicle impacts for the BLF building phase.
 - A 10m buffer is used for the construction zone for building the SCDF.
 - The boundary between the north-east and main sections of the SCDF is arbitrarily drawn.
 - No spatial footprint is assigned for elevated Suspended Sediment Concentration (SSC) or sedimentation from sediment plumes generated during the insertion of BLF piles as these are considered to be very small.

Table 1.9: Inter-relationship combinations per year.

Year	Inter-relationship impacts
Year 2022.	All building components for the BLF (as given in Appendix 20A of Volume 2 of the ES), along with BLF pile scour and BLF piles on the seabed.
Year 2023.	All activity components for building the BLF construction phase, along with Combined Drainage Outfall (CDO) head installation and operation, building and using the SCDF in the north east section, BLF pile scour and effects of BLF piles on the bed.

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Year	Inter-relationship impacts
Year 2024, first semester (i.e. first 6 months)	All activity components for building the BLF, along with building the SCDF in front of the main HCDF section (south of the BLF), any activity component for using the BLF, CDO and north east section of the SCDF, including capital and maintenance dredging of BLF approach.
Year 2024, second semester (i.e. last 6 months)	All activity components for building the BLF, along with building the SCDF in front of the main HCDF section, any activity component for using the BLF, CDO and SCDF, including maintenance dredging of BLF approach.
Year 2025.	All activity components for building the cooling water intakes and outfalls (except for tunnelling, which is subterranean and therefore not a marine activity), any activity component for using the BLF, CDO and SCDF, scour/scour protection at the intakes and outfalls, including maintenance dredging of BLF approach.
Year 2026, first semester.	All activity components for building the cooling water intakes and outfalls, any activity component using the BLF/SCDF/CDO, scour/scour protection at the intakes and outfalls.
Year 2026, second semester.	All activity components for building the cooling water intakes and outfalls, any activity for building Fish Recovery and Return unit 1 (FRR1), any activity component for using the BLF/SCDF/CDO/FRR1, scour/scour protection at the intakes and outfalls, including maintenance dredging of BLF approach.
Year 2027, first semester.	All activity components for building the cooling water intakes and outfalls, any activity component for using the BLF/SCDF/CDO, including maintenance dredging of BLF approach, any activity for building FRR1, any activity component for using FRR1.
Year 2027, second semester.	All activity components for building the nearshore cooling water intakes and outfalls, any activity component for using the BLF/SCDF/CDO, including maintenance dredging of BLF approach, any activity component for using FRR1.
Year 2028, first semester.	All activity components for building the nearshore cooling water intakes and outfalls, any activity component for using the BLF/SCDF/CDO, including maintenance dredging of BLF approach, any activity component for using FRR1.
Year 2028, second semester.	All activity components for building the cooling water intakes and outfalls, any activity for building FRR2, any activity component for using the BLF/SCDF/CDO, including maintenance dredging of BLF approach, any activity component for using FRR1.
Year 2029 and onwards.	Any activity component for using the BLF/SCDF/CDO, including maintenance dredging of BLF approach, any activity component for using FRR1 and FRR2.

NOT PROTECTIVELY MARKED

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VOLUME 1, CHAPTER 6, APPENDIX 6Q : MARINE WATER QUALITY AND SEDIMENT LEGISLATION AND METHODOLOGY

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None provided.

1. Marine Water Quality and Sediment Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects arising from the construction, commissioning and operation of Sizewell C on marine water and sediment quality. This appendix applies to the assessment presented in **Volume 2, Chapter 21** of the **Environmental Statement (ES)** (Doc Ref. 6.3).

1.1.2 The marine water and sediment quality assessment is informed by data from other assessments as following:

- Coastal geomorphology and hydrodynamics in **Chapter 20** of **Volume 2** of the **ES**.
- Marine ecology and fisheries in **Chapter 22** of **Volume 2** of the **ES**.

a) Marine water quality and sediment assessment structure

1.1.3 The marine water quality and sediment **ES** chapter follows the structure maintained throughout the **ES**. Assessment methodologies conform to those detailed in the 2019 EDF Energy Environmental Impact Assessment (EIA) Scoping Report, provided in **Appendix 6A** of this volume, and updated in line with the EIA Scoping Opinion received from the Secretary of State, provided in **Appendix 6B** of this volume.

1.1.4 Assessments are based on development components and consider impacts during construction and operation. The development components considered in the Marine Water Quality and Sediments assessment during construction and operation of the proposed development include:

- the coastal defence feature;
- the beach landing facility (BLF);
- the cooling water infrastructure (intakes and outfalls);
- the fish return and recovery (FRR) system; and
- the combined drainage outfall (CDO).

- 1.1.5 Activities associated with each development component have been identified and the relevant pressures with the potential to effect marine water and sediment quality are assessed. The intention of the structure is to allow rapid identification of the potential for effects for any given development component.

1.2 Legislation, policy and guidance

- 1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant marine water quality and sediment.

- 1.2.2 Legislation and policy has been considered on an international, national, regional and local level, and has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International legislation

i. Habitats Directive

- 1.2.1 The European Council Directive 92/43/ECC on the Conservation of natural habitats and of wild fauna and flora was brought into force in 1992. In summary, the Habitats Directive requires member states to adopt an ecologically coherent network of protected sites for habitats and species listed in Annex I and Annex II of the Directive, respectively. Special Areas of Conservation (SACs) are designated and used in conjunction with Special Protection Areas (SPAs) (refer to Birds Directive below) to form a network of Natura 2000 sites. The Habitats Directive was transposed into United Kingdom (UK) law through the Conservation of Habitats and Species Regulations 2010, which have been repealed and replaced by the 2017 Regulations and has effect within 12 nautical miles of the UK coast.

- 1.2.2 The area of open sea adjacent to the eastern boundary of the main development site is part of the southern North Sea SAC. The SAC was formally designated in February 2019 for Annex II species harbour porpoise (*Phocoena phocoena*). The **ES** (Doc Ref. Book 6) considers the conservation objectives of the SAC (Ref. 1.1) when determining the significance of effects arising from development impacts.

ii. The Oslo and Paris convention for the protection of the marine environment of the north-east Atlantic (OSPAR)

1.2.3 The OSPAR Convention (1992) seeks to protect the marine environment of the north-east Atlantic through international co-operation. Part of its focus complements ongoing work under the Habitats Directive and other international agreements by establishing a list of species, habitats and ecological processes that are threatened and/or declining.

iii. Water Framework Directive

1.2.4 The Water Framework Directive (WFD) is the European Union's (EU) approach to holistic management of European surface water bodies. The WFD covers groundwaters, lakes, rivers, transitional waters (estuaries and lagoons) and coastal waters up to 1 nautical mile from low water. The WFD requires EU member states to classify and monitor the quality of waters in designated river basin districts, placing surface waterbodies into one of five ecological classes (high, good, moderate, poor, and bad) and reporting on their monitoring schemes in River Basin Management Plans.

1.2.5 Waterbodies are classified by way of hydromorphological criteria, ecological and physico-chemical assessments and the application of environmental chemical standards for priority substances and specific pollutants. The competent authority (the Environment Agency) has set Environmental Objectives for each water body with the objective in all water bodies to prevent deterioration in either the 'ecological status' (for natural water bodies) or the 'ecological potential' (for heavily modified or artificial water bodies).

1.2.6 Existing standards more stringent than under the WFD will apply for certain types of water body defined under the Directive as 'protected areas' e.g. Bathing Water Directive and the Habitats Directive.

1.2.7 Under the WFD, certain substances that are regarded as the most polluting were identified in 2001. This first list of substances became Annex X of the WFD and was replaced by Annex II of the Directive on Environmental Quality Standards (Directive 2008/105/EC) (EQSD), also known as the Priority Substances Directive and this was further updated in 2013, Directive 2013/39/EU. For Sizewell the relevant priority substances are cadmium, lead, mercury and nickel; for these substances Environmental Quality Standards (EQS) are determined at the European level, and these apply to all Member States.

iv. Bathing Waters Directive

- 1.2.8 A revised Bathing Waters Directive (2006/7/EC) was adopted in 2002 and came into force in 2006, eventually replacing the 1976 Bathing Waters Directive in 2014 (76/160/EEC). The Bathing Waters Regulations 2013 came into force on 31 July 2013 to protect the quality of bathing waters used by bathers. The Directive requires sampling and analysis for bacteriological parameters *Escherichia coli* and intestinal *enterococci*, as well as requiring better arrangements for management of bathing water quality.

v. Shellfish Waters Directive

- 1.2.9 The Shellfish Waters Directive (2006/113/EC) sets environmental standards for the quality of the waters where shellfish live in order to promote healthy shellfish growth. The Directive sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with ('mandatory' standards) or endeavour to meet ('guideline' standards). It does not cover shellfish crustaceans such as crabs, crayfish and lobsters.

vi. Marine Strategy Framework Directive

- 1.2.10 In 2008, the European Union adopted Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy. Known as the Marine Strategy Framework Directive, the Directive aims to implement an effective mechanism to protect the marine environment across Europe and achieve 'good environmental status' (GES) by 2020.

b) National legislation

i. Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

- 1.2.1 The EU WFD was transposed into UK law as The Water Environment (WFD) (England and Wales) Regulations 2003. To meet the requirements of the WFD, the competent authority (the Environment Agency) has set Environmental Objectives for each water body. By default, the objective in all water bodies is to prevent deterioration in either the 'ecological status' (for natural water bodies) or the 'ecological potential' (for heavily modified or artificial water bodies).
- 1.2.2 The Suffolk coastal waterbody (code: GB650503520002) directly adjacent to the proposed development is classified as having 'moderate ecological

potential'. The current Cycle 2 biological quality element for phytoplankton is classified as 'good' (Environment Agency, 2019, Ref. 1.2)

1.2.3 For substances other than those classified as 'priority' substances, standards may be derived by each Member State, and they should lay down, where necessary, rules for their management. This list of compounds or specific pollutants is defined as substances that can have a harmful effect on biological quality, and which may be identified by Member States as being discharged to water in 'significant quantities'.

1.2.4 The WFD is designed to protect the ecological health of the water body, and as a result, the shellfish growing within it. The Water Environment Regulations (2003) were amended in 2016 to provide specific powers for the designation of transitional and coastal waters where shellfish are harvested to contribute to a high-quality shellfish product for human consumption and to place requirements regarding the monitoring of any designated waters.

ii. [Bathing Waters Regulations 2013](#)

1.2.5 The Bathing Waters Regulations 2013 came into force on 31 July 2013 to protect the quality of bathing waters used by bathers. The Regulations require sampling and analysis for bacteriological parameters *Escherichia coli* and intestinal enterococci, as well as requiring better arrangements for management of bathing water quality.

iii. [Countryside and Rights of Way Act 2000](#)

1.2.6 In England the Countryside and Rights of Way Act 2000 increases measures for the management and protection of Sites of Special Scientific Interest (SSSI) and provides for better management of areas of outstanding natural beauty (AONB).

1.2.7 The SSSI sites of relevance to the marine water quality and sediment assessment are Minsmere to Walberswick Heaths and Marshes SSSI. Potential marine impacts to the SSSI are considered in **Volume 2 Chapter 20** of the **ES**, Geomorphology and Hydrodynamics, including a narrative discussion of potential future effects. The assessment presented in **Volume 2 Chapter 21** of the **ES** considers the potential for chemical or thermal discharges to impact the coastal marshes through overtopping or percolation through the dune systems.

iv. Marine and Coastal Access Act 2009

- 1.2.8 In 2009, the Marine and Coastal Access Act 2009 became law, creating new management bodies. The Marine and Fisheries Agency became the Marine Management Organisation (MMO) in 2009, and the regional Sea Fisheries Committees became Inshore Fisheries and Conservation Authorities in April 2011.
- 1.2.9 The Marine and Coastal Access Act 2009 introduced new planning and management systems for overseeing the marine environment, most notably through the requirement to obtain marine licences for works within the UK marine area at sea (including the deposition or removal of any substance or object from the sea below mean high water). It created a strategic marine planning system that seeks to promote the efficient, sustainable use and protection of the marine environment, guided by the Marine Policy Statement and a series of Marine Plans. The Act seeks to implement a series of Marine Conservation Zones (MCZ) to sit alongside European Marine Sites (SACs/SPAs), SSSIs and Ramsar sites to form an ecologically coherent network of marine protected areas.
- 1.2.10 The Orford Inshore MCZ was part of the third tranche of MCZs that was formally designated in May 2019. Located approximately 14 kilometres (km) offshore from the Alde-Ore Estuary, the site is composed of subtidal mixed sediments that form important nursery and spawning grounds for some species of fish including Dover sole, lemon sole and sand eels. Burrowing anemones, sea cucumbers, urchins, starfish and nationally important shark species are found at the MCZ. The MCZ is an important foraging area for seabirds and harbour porpoise has also been observed within the site. The protected feature of the site is ‘subtidal mixed sediments’ with a general management approach of ‘recover to a favourable condition’.

v. Conservation of Habitats and Species Regulations 2017

- 1.2.11 The Habitats Directive was transposed into the UK law through the Conservation of Habitats and Species Regulations 2010, which have been repealed and replaced by the 2017 Regulations.
- 1.2.12 The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations) transpose the EC Habitats Directive and elements of the EU Wild Birds Directive into national law in England and Wales. The Habitats Regulations provide the legislative enforcement for the protection of Natura 2000 sites within the limit of territorial waters (12nm) and protect species and habitats listed in Annex I and II of the EC Habitats Directive. Beyond the

12nm limit, the EC Habitats Directive and elements of the EU Wild Birds Directive are transposed into national law by the Conservation of Offshore Marine Habitats and Species Regulations 2017. Both inshore and offshore, the regulations make it an offence to deliberately capture, injure, kill or disturb any European Protected Species (EPS) listed in Schedule 2, or to damage or destroy a breeding site or resting place of such an animal. All cetaceans are listed as EPS in Schedule 2.

vi. Salmon and Freshwater Fisheries Act 1975

- 1.2.13 The act consists of several sections some which relate to methods of fishing. The Act also deals with problems of pollution making it an offence to knowingly permit the flow of poisonous matter and polluting effluents into river courses. Part II of the Act deals with obstructions to the passage of salmon and trout (including sea trout).

c) National Policy

i. National Policy Statement

- 1.2.14 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.3) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.4). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.15 The NPSs set out the Government's energy policy, the need for new infrastructure, and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.16 NPS EN-1 specifies key aspects to the ES that the applicant should include:
- The applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.

- The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests.

1.2.17 The requirements of NPS EN-1 and EN-6 are provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1: 4.8	Climate Change. New energy infrastructure has long operational life cycles and needs to remain operational over the period of multiple decades and in the face of climate change.	The influence of warming sea temperatures and ocean acidification are considered in relation to thermal and chemical discharges and water quality status.
EN-1: 4.10	Pollution control and other environmental regulatory regimes Consideration given to processes, emissions and discharges.	Establishment of baseline conditions for marine environment and assessment of significance of discharge concentration/loading upon marine sediment and water quality and identification of appropriate source control limits. Inclusion of deemed marine licence.
EN-1: 5.15	Water quality and resources. During the construction, operation and decommissioning phases, infrastructure development can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment.	Establishment of baseline conditions for marine environment and assessment of significance of discharge concentration/loading upon marine water quality and dependent features. A high-level description of the anticipated activities for the decommissioning of the Sizewell C power station, including a summary of the types of environmental effects likely to occur is provided in Chapter 5 of Volume 2 of the ES . As discussed in Chapter 5 of Volume 2 of the ES , for the decommissioning of the proposed development, it is necessary to obtain prior consent from the Office for Nuclear Regulation and undertake a separate EIA at the time of submission.
EN-6 (vol. 1): 3.9	Cumulative effects	The cumulative impacts of the proposed development with other plans, projects and proposals on

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<p>Potential cumulative ecological effects have been identified by the Appraisal of Sustainability for NPS EN-6 at sites in the east of England.</p> <p>Applicants must consider cumulative ecological effects.</p>	<p>marine water quality and sediment is also assessed. This assessment is presented in Chapter4 of Volume 2 of the ES.</p>

ii. Marine Policy Statement

1.2.18 The Marine Policy Statement supports maintaining the 11 descriptors of GES detailed in the Marine Strategy Framework Directive.

1.2.19 As a general principle, development should aim to avoid harm to marine ecology, biodiversity and geological conservation interests (including geological and morphological features), including through location, mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, then appropriate compensatory measures should be sought. Development proposals may provide, where appropriate, opportunities for building-in beneficial features for marine ecology, biodiversity and geodiversity as part of good design.

1.2.20 The descriptors for achieving good environmental status under the Marine Strategy Framework Directive include ensuring that contaminants are at a level not giving rise to pollution effects. Proposals should take account of any potential impacts on ecological and chemical quality.

d) Regional Policy

i. East Inshore Marine Plan 2014

1.2.21 The East Inshore Marine Plan is intended to be a means of holistic management to deliver the vision of “*clean, healthy, safe productive and biologically diverse oceans and seas*” (Ref. 1.5), under the Marine and Coastal Access Act 2009. The East Inshore Marine Plan area extends from Flamborough Head in the north to Felixstowe in the south with a seaward limit stretching 12nm offshore. The MMO is responsible for the East Inshore Marine Plan, which will form part of the Integrated Coastal Zone Management overseeing the areas’ resources, and the activities and interactions that take place within them and ensure sustainable development.

ii. Eel Management Plans

1.2.22 Eel Management Plans are a requirement of each Member State with the target of achieving 40% of the potential biomass of escapement of silver eels to the spawning population that could be expected in the absence of anthropogenic disturbance. Such disturbances include fishing, barriers to migration and water quality issues. Across England, Eel Management Plans are set at the WFD defined River Basin District (RBD) level. The proposed development falls under the Anglian RBD.

1.2.23 The Anglian RBD Eel Management Plan identifies the potential for mortalities of adult yellow eels and migrating silver eels following entrainment in pumping stations within the RBD. Furthermore, development activities with the potential to act as a barrier (either physical, thermal or chemical) to eel or other migratory fish species are assessed in **Chapter 22 of Volume 2** of the **ES**.

e) Local Policy

1.2.24 The Sizewell C Project main development site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council. On 1 April 2019, ESC was formally established in place of SCDC and Waveney District Council.

1.2.25 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan (SCLP) and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the SCLP.

1.2.26 The adopted SCLP comprises the: 'saved policies' of the SCLP (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

1.2.27 In March 2019, SCDC submitted their draft new SCLP (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. Suffolk Coastal District Plan

1.2.28 Suffolk Coastal District Local Plan July 2013 – policy SP13 lists the assessment of ecological impacts on nearby designated sites as a local issue

to be considered by the Council in the Local Impact Report if an application for the Sizewell C power station is submitted.

f) **Guidance**

- 1.2.29 Marine water quality and sediments methods apply an assessment based approach to assess the potential effects of the proposed development based on the principles used for marine ecology receptors following the Chartered Institute of Ecology and Environmental Management (CIEEM) good practice guidelines (CIEEM, 2018) (Ref. 1.6).
- 1.2.30 The potential effects of the proposed development were identified by applying an activities-pressures matrix following the approach outlined in the Healthy and Biologically Diverse Seas Evidence Group (JNCC, 2013) (Ref. 1.7).
- 1.2.31 The list of activities relevant to marine water quality and sediment were identified from those set out in the OSPAR list of pressures (Ref. 1.8)
- 1.2.32 The marine water quality and sediment assessments draw on several guidance documents for chemical standards and approaches to effects assessment and these are discussed and referenced in relevant sections and technical appendices. Guidance includes standards and reference values for chemical contamination of sediments (Ref. 1.9) and for waterbody turbidity classified by suspended sediment levels (Ref. 1.10) in relation to dredging and other activity causing sediment disturbance.
- 1.2.33 In the absence of EQS values for some toxic chemicals, the use of Predicted No Effect Concentration (PNEC) values have been used. The derivation of PNEC values from toxicity studies uses the approach recommended in Common Implementation Strategy (CIS) Guidance (Ref. 1.11) and EU Technical guidance (Ref. 1.12).

1.3 **Methodology**

- 1.3.1 The generic EIA methodology is detailed in **Chapter 6** of this volume.
- 1.3.2 This section provides specific details of the marine water quality and sediment methodology applied to the assessment of the proposed development and a summary of the general approach to provide appropriate context for the assessment that follows.

1.3.3 Potential development activities and associated pressures were considered and assessed to identify those likely to influence marine water quality and sediment.

a) Scope of the assessment

1.3.4 The scope of the assessment has also been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.

1.3.5 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

1.3.6 The assessment considers the impacts of the activities taking place during the construction, commissioning and operation of the proposed development.

1.3.7 For the marine ecology assessment provided in **Volume 2, Chapter 22** of the **ES**, the potential effects of the proposed development were identified by applying an activities-pressures matrix following the approach outlined by the Joint Nature Conservation Committee Healthy and Biologically Diverse Seas Evidence Group (2013) (Ref. 1.7). The initial step reviewed the construction and operational elements of each development component to determine the site-specific list of activities. The full list of activities for each development component was cross tabulated with the OSPAR Intercessional Correspondence Group on Cumulative Effects (ICG-C) list of pressures (Ref. 1.8).

1.3.8 For marine water quality and sediment, a similar approach was adopted but with a more limited list of pressures relevant to water and sediment quality.

1.3.9 The relevant pressure themes for water and sediment quality are hydrological changes specifically local temperature change and ‘pollution and other chemical changes from sediment resuspension or discharges’ with the following pressures identified:

- synthetic compound contamination Phase 1;
- introduction of other substances (solid, liquid or gas);
- nutrient enrichment;

- organic enrichment from sediment resuspension or discharge; and
- deoxygenation.

Potential development activities and associated pressures were considered and assessed to identify those likely to influence marine water and sediment quality.

b) Study area

1.3.10 The Greater Sizewell Bay (GSB) is anchored in the north by the Blyth river jetties and in the south by the Thorpeness Headland and underlying erosion-resistant Coralline Crag, which outcrops sub-tidally. The seaward boundary extends to the eastern flank of the Sizewell-Dunwich Bank, to include the spatial extent of the proposed cooling water infrastructure. The landward limit is delineated by the mean high-water springs (MHWS) tidal mark.

1.3.11 As the GSB is an open coastal system water exchanges between the bay and the rest of the southern North Sea. The spatial extent of potential impacts from the proposed development are therefore dependent on the tidal regime and the transmission and persistence of the pressure. Zones of Influence (ZoI) for marine water quality and sediment have been informed by the largest-scale potential impacts associated with the main development site, these include:

- Results from suspended sediment plume modelling associated with dredging and drilling activities.
- Thermal plume modelling of the in-combination impacts of Sizewell B and Sizewell C cooling water discharges (applying the 2°C mean excess temperature contour at the seabed).

c) Designated sites within the study area

1.3.12 Several statutory and non-statutory designated sites are located within the ZoI.

1.3.13 The proposed development has the potential to affect ecological sites designated as being of European or international importance for nature conservation. Consequently, a **Shadow Habitats Regulations Assessment** (HRA) (Doc Ref. 5.10) has been submitted to the Planning Inspectorate. The **Shadow HRA** details the likely significant effects on the designated features of European Sites including SPAs, SACs and Ramsar sites within the ZoI.

- 1.3.14 In conjunction with the **Shadow HRA** the marine water quality and sediments assessment (**Chapter 20** of **Volume 2** of the **ES**) considers the specific marine components (below MHWS) of designated European sites. Consideration is also given to marine impacts of the proposed development on SSSI and county wildlife sites (CWS). Sites of relevance to the marine water quality and sediment assessment are identified and relevant chapters for assessing receptors beyond the scope of the marine water quality and sediments assessment (**Chapter 21** of **Volume 2** of the **ES**) are referenced in **Table 1.2** below.
- 1.3.15 Direct effects on seabirds and vegetated shingle (annual vegetation of drift lines) are considered within **Volume 2, Chapter 14** of the **ES** - Terrestrial Ecology and Ornithology and **Volume 2, Chapter 20** of the **ES** - Coastal Geomorphology and Hydrodynamics. Indirect effects on designated features, including effects on prey species or effects on supporting habitat, are considered in the marine water quality and sediments assessment (**Chapter 21** of **Volume 2** of the **ES**).
- 1.3.16 Effects on the abundance and distribution of marine prey species from impacts from the proposed development are considered in **Volume 2, Chapter 22** of the **ES** in relation to designated seabirds and marine mammals (harbour porpoise and seals).
- 1.3.17 Impacts on supporting habitats include water quality processes i.e. the potential for changes in water quality (thermal or chemical discharges) to impact intertidal or coastal wetland habitats (either through direct contact, percolation or overtopping) are also considered here.
- i. [Water quality impacts on coastal designated habitats](#)
- 1.3.18 Sites within the Zol for water quality and coastal geomorphology impacts include:
- Minsmere to Walberswick SPA and Ramsar site;
 - Minsmere to Walberswick Heath and Marshes SSSI;
 - Outer Thames SPA, and;
 - Southern North Sea SAC.
- 1.3.19 The potential for water quality issues associated with the proposed development to affect the Minsmere to Walberswick SPA, Ramsar site, Minsmere to Walberswick Heath and Marshes SSSI, and the associated

Royal Society Protection of Birds Minsmere reserve has been identified. Effects may result from direct entry into the Minsmere reserve through the Leiston drain when the Minsmere sluice is open. Alternatively, contaminants may percolate through the dune system or overtop during storm events or as a result of future baselines.

- 1.3.20 Relevant modelling assessments consider the potential for construction, commissioning and operational discharges to influence Minsmere habitats.

Table 1.2: Statutory designated sites and non-designated sites with marine components.

Site and Location	Description Of Site Features With Marine Components	How The Site Is Considered In The Marine Water Quality And Sediment Assessment
<p>Minsmere to Walberswick SPA and Ramsar site.</p> <p>Located adjacent to the north-east boundary of the main development site.</p>	<p>The site consists of a mosaic of marshes, dykes, reedbeds, brackish lagoons, mudflats, shingle and driftlines.</p> <p>The SPA is designated for breeding, wintering and passage bird populations of European importance.</p> <p>The Ramsar site supports a diverse range of wetland bird species in nationally important numbers.</p>	<p>Potential changes in subtidal beach processes which could change the exposure of supratidal habitats to marine impacts are assessed in Volume 2 Chapter 20 of the ES.</p> <p>Volume 2, Chapter 21 of the ES considers the potential for chemical or thermal discharges to impact the wetland habitats through direct intersecion, overtopping or percolation through the dune sytems.</p> <p>The effects on marine prey species of designated birds are also considered.</p> <p>Juvenile eels (glass eels/elvers) migrate from the marine environment into freshwater where they remain for many years (up to 20 years) until they are ready to return to the Sargasso Sea as adult silver eels. The potential for distuption to migratory pathways is assessed and covered in Volume 2, Chapter 21 of the ES and in detail in Volume 2 Chapter 22 of the ES.</p> <p>Likely significant effects on designated bird species is assessed as part of the Shadow Habitats Regulations Assessment (HRA) marine assessments (Doc Ref. 5.10).</p>
<p>Minsmere to Walberswick Heaths and Marshes SSSI.</p> <p>Adjacent to the north of the main development site.</p>	<p>This SSSI contains a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh.</p> <p>These habitats combine to create an area of exceptional scientific interest that supports a diverse breeding and wintering bird assemblage and a diverse range of invertebrates.</p>	<p>Natural marine incursions to the SSSI may be delayed by the impacts of the proposed development on the present baseline shoreline processes. Impacts on an unknown future shoreline baseline may be different. Impacts to the SSSI are considered in Volume 2 Chapter 20 of the ES, including a narrative discussion of potential future effects.</p> <p>Volume 2 Chapter 21 of the ES considers the potential for chemical or thermal discharges to impact the coastal marshes through overtopping or percolation through the dune systems.</p>

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Site and Location	Description Of Site Features With Marine Components	How The Site Is Considered In The Marine Water Quality And Sediment Assessment
<p>Alde-Ore Estuary SPA and Ramsar site.</p> <p>Approximately 5km south of the main development site.</p>	<p>The Alde-Ore Estuary is identified as a Ramsar site for its diverse and nationally important wetland bird species, and as an SPA because it supports bird populations of European importance.</p> <p>The site also supports a seabird assemblage of international importance.</p>	<p>Thermal and chemical plumes at ecologically relevant concentrations do not intersect the wetlands within the mouth of the Alde-Ore Estuary and are not considered further (Ref. 1.13).</p> <p>Volume 2 Chapter 22 of the ES considers the potential development impacts on the marine prey species of designated birds.</p>
<p>Benacre to Easton Bavents SPA.</p> <p>Approximately 15km north of the main development site.</p>	<p>The site qualifies by supporting breeding and over wintering bittern, breeding little tern and breeding marsh harrier.</p>	<p>The site is too far away to be influenced by impacts to coastal geomorphology.</p> <p>The site is too far away and tern foraging areas too restricted to be influenced by thermal and chemical discharges at ecologically relevant levels.</p> <p>Likely significant effects on designated bird species is assessed as part of the Shadow Habitats Regulations Assessment (HRA) marine assessments (Doc Ref. 5.10).</p>
<p>Outer Thames Estuary SPA.</p> <p>Includes the area of open sea adjacent to the main development site.</p>	<p>The Outer Thames Estuary SPA qualifies by supporting populations of European importance of wintering red-throated diver (<i>Gavia stellata</i>).</p> <p>The site also protects foraging areas for little tern and common tern during the breeding season enhancing the protection already afforded to their feeding and nesting areas in the adjacent coastal SPAs (including the Minsmere to Walberswick SPA).</p>	<p>Volume 2 Chapter 22 of the ES considers the potential development impacts on the marine prey species of designated birds.</p> <p>Breeding little tern and common tern (May – August) feed on schooling pelagic fish species that are found near to the sea surface during daylight hours including sprat, herring and anchovy.</p> <p>Over wintering/passage red-throated diver (September to March) feed on the most commonly occurring benthopelagic species - sprat, herring, whiting and seabass.</p>

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Site and Location	Description Of Site Features With Marine Components	How The Site Is Considered In The Marine Water Quality And Sediment Assessment
		Likely Significant Effects on designated bird species is assessed as part of the Shadow HRA (Doc Ref. 5.10)..
<p>Orfordness-Shingle Street SAC.</p> <p>Approximately 8km south of the main development site.</p>	<p>The habitats that are a primary reason for selection of this site are 'coastal lagoons', 'annual vegetation of drift lines' and 'perennial vegetation of stony banks'.</p> <p>The coastal lagoons are not a marine feature as they occur landward of highest astronomical tide, and form part of the percolation lagoon features on the east coast.</p>	<p>The site is too far away to be influenced by thermal and chemical discharges from the proposed development.</p> <p>The site is too far away to be influenced by impacts to coastal geomorphology.</p> <p>No further assessment is made.</p>
<p>Deben Estuary SPA and Ramsar site.</p> <p>Approximately 30km south of the main development site.</p>	<p>The SPA qualifies by supporting overwintering populations of avocet.</p> <p>The Deben Estuary Ramsar site supports: a population of the mollusc <i>Vertigo angustior</i>; and an overwintering population of dark-bellied Brent goose (<i>Branta bernicla bernicla</i>).</p>	<p>Avocet feed non-selectively on aquatic invertebrates such as insects, crustaceans, worms, some molluscs, fish and plant matter.</p> <p>Dark bellied Brent geese feed on intertidal vegetation such as <i>Enteromorpha</i>, <i>Ulva</i>, <i>Zostera</i> and salt marsh vegetation in addition to terrestrial grasses and cereals.</p> <p>The site is beyond the ZOI, therefore there are no predicted effects on the prey of these species. No further assessment is made.</p>
<p>Southern North Sea SAC.</p> <p>Includes the area of open sea adjacent to the main development site.</p>	<p>The southern North Sea SAC is designated for the Annex II species harbour porpoise (<i>Phocoena phocoena</i>) for both winter and summer seasons.</p>	<p>Harbour porpoise are a key species assessed in Volume 2, Chapter 22 of the ES.</p> <p>Direct and indirect effects on prey species are considered in Volume 2, Chapter 22 of the ES.</p>

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Site and Location	Description Of Site Features With Marine Components	How The Site Is Considered In The Marine Water Quality And Sediment Assessment
<p>Orford Inshore MCZ.</p> <p>Offshore, approximately 16km south-east of the main development site and 14km from the Alde Ore estuary.</p>	<p>The site is composed of subtidal mixed sediments that form important nursery and spawning grounds for some species of fish, the area is an important foraging area for seabirds and Harbour porpoise pass through the site. The protected features at the site are 'subtidal mixed sediments'.</p>	<p>The Orford Inshore MCZ is beyond the Zol and is not considered to have any effect on the management objectives of the protected features at the site.</p> <p>The site is too far away to be influenced by impacts to coastal geomorphology. No shingle or sand transport connection.</p> <p>No further assessment is made.</p>
<p>Humber Estuary SAC.</p> <p>Approximately 220km north of the main development site.</p>	<p>The site is designated for the Annex II species grey seal (<i>Halichoerus grypus</i>).</p>	<p>Whilst the SAC is located well beyond the Zol, grey seals are highly mobile species and individuals from the designated site may transit past the site or utilise the area for foraging.</p> <p>Grey seals are a key species assessed in Volume 2, Chapter 22 of the ES.</p> <p>Direct and indirect effects on prey species are considered in Volume 2, Chapter 22 of the ES.</p>
<p>The Wash and North Norfolk Coast SAC.</p> <p>Approximately 120km north of the main development site.</p>	<p>The site is designated for the Annex II species harbour seal (<i>Phoca vitulina</i>).</p>	<p>The SAC is located well beyond the Zol; however, harbour seals are highly mobile species and individuals from the designated site may transit past the site or utilise the area for foraging.</p> <p>Harbour seals are a key species assessed in Volume 2, Chapter 22 of the ES.</p> <p>Direct and indirect effects on prey species are considered in Volume 2, Chapter 22 of the ES.</p>
<p>Leiston to Aldeburgh SSSI.</p> <p>Approximately 1km south of the main development site.</p>	<p>This SSSI contains a rich mosaic of habitats.</p> <p>There is a gradual transition between the vegetated shingle of the strandline community and the shingle</p>	<p>Preservation of the vegetated shingle would only be affected by Sizewell C Project if the development were to physically intercede in the present (long-term net) southward sediment transport system at some point in the future. Future mitigation is proposed to compensate for the initial impact of the development and so prevent effects on the</p>

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Site and Location	Description Of Site Features With Marine Components	How The Site Is Considered In The Marine Water Quality And Sediment Assessment
	heath resulting from increasing stability and distance from tidal influence.	<p>SSSI. However, the possibility that mitigation eventually ceases, leading to impacts on an unknown future shoreline baseline, is considered in Volume 2, Chapter 20 of the ES, as a narrative discussion of potential future effects.</p> <p>Vegetated shingle is considered within the Terrestrial Ecology and Ornithology chapter in Volume 2, Chapter 14 of the ES.</p> <p>No further assessment is made on the Leiston to Aldeburgh SSSI in Volume 2, Chapter 21 of the ES.</p>
Suffolk Shingle Beaches CWS.	The CWS forms part of the east coast vegetated shingle matrix and supports coastal sand and shingle habitats, a diverse assemblage of invertebrate species is found at the coastal site.	<p>Impacts on an unknown future shoreline baseline are considered in Volume 2, Chapter 20 of the ES, as a narrative discussion of potential future effects.</p> <p>Vegetated shingle is considered within Volume 2, Chapter 14 of the ES.</p>

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d) Assessment scenarios

- 1.3.21 Marine water quality and sediment assessment scenarios consider the construction, commissioning and operational phases of the proposed development.
- 1.3.22 A high-level assessment of decommissioning is provided in **Volume 2 Chapter 5** of the **ES**.
- 1.3.23 The construction period is expected to last between nine and 12 years. An indicative starting point for construction Year 1 is taken to be 2022 but changes to this start date are unlikely to make a significant difference to the assessments made. There are five phases to the main construction period:
- Phase 1: Site establishment and preparation for earthworks.
 - Phase 2: Main earthworks.
 - Phase 3: Main civil works.
 - Phase 4: Mechanical and Engineering installation.
 - Phase 5: Commissioning and land restoration.
- 1.3.24 Details of construction activities during each phase are set out in **Volume 2 Chapter 3** of the **ES**.
- 1.3.25 The marine components relevant to each phase are briefly summarised in this section. An understanding of the construction sequence is required in order to assess the inter-relationship or in-combination effects within the Sizewell C Project.
- 1.3.26 During Phase 1 the work will commence with the construction of the BLF and the northern coastal defence. The CDO system would be constructed.
- 1.3.27 Phase 2 would involve the primary earthworks including the excavation of the Made Ground at the power station platform area, within the cut-off area. During Phase 2 dewatering volumes will peak.
- 1.3.28 The construction of the power station and ancillary infrastructure would occur in Phase 3. The accommodation campus would be in full use, and the associated discharge of treated sewage is assessed. Permanent infrastructure relevant to the marine environment includes:
- construction of the cooling water intake and outfalls;

- insertion intake and outfall headworks, drilling vertical shafts;
- installation cooling water structures and main pump house;
- construction of the two FRR tunnels and associated outfalls;
- construction of costal defence feature.

1.3.29 In Phase 4, building works including the cooling water infrastructure and the two reactors are primarily completed and engineering of the main power station begins. Completion of reactor Unit 1 and Unit 2 is expected to be separated by 12 months.

1.3.30 During the commissioning the power station will be tested including flushing of the fluid systems. Discharges would be made via the CDO during early cold commissioning or via the main cooling water infrastructure during hot functional testing and once completed.

1.3.31 Based on the shortest nine-year construction timeline and assumed start date, the earliest the proposed development is likely to be operational is 2034.

e) Impact assessment criteria: Marine water quality and sediment

1.3.32 As described in **Chapter 6** of this volume, the EIA methodology considers whether impacts of the proposed development would influence any resources or receptors. Assessments broadly consider the magnitude of impacts relative to baseline conditions and value/sensitivity of resources/receptors that could be affected in order to classify significance of effects.

1.3.33 For marine water quality and sediment, the term receptor refers to the model domain for the relevant water quality parameter for which the total extent over which an individual water quality assessment value is exceeded is assessed. The outcome indicates where further detailed assessment of impacts on designated areas or species are indicated.

ii. Receptor Value

1.3.34 Water quality and sediment of the study area are identified as supporting features and receptor value is dependent on the species and habitats that would be influenced by any changes to baseline conditions.

1.3.35 Value of the receptor for water quality and sediment is uncoupled from assessment of sensitivity so that the latter can be undertaken for a given

impact independently of value. The value of receptor (model domain) which encompasses designated areas would vary between medium to high dependent on overlap with specific designated areas and sensitivities with which it is aligned (Table 1.3). However, the assessment is made using magnitude and sensitivity with further evaluation made in the Marine Ecology chapter for those results that indicate minor or greater effects for marine water quality.

Table 1.3: Marine water quality and sediment receptor value aligned with associated ecological features or receptors.

Value	General Description For Assigning Value
High	<ul style="list-style-type: none"> High ecological value (other ecosystem features dependent on it). International conservation value such as designated feature of a SAC, SPA, Ramsar sites, or SSSIs. Species “of principal importance for the purpose of conserving biodiversity” listed in Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006. National/international socio-economic value.
Medium	<ul style="list-style-type: none"> Moderate ecological value (e.g. abundant/common and/or another feature partially depends on it). National conservation value such as designated features of regional or county importance, such as County Wildlife Sites (CWSs), Conservation Areas. Moderate national/regional socio-economic value (e.g. commercial fishery).
Low	<ul style="list-style-type: none"> Low ecological value (e.g. not selected as an abundant/common taxa and/or limited connection to other ecosystem features). Regional/local conservation value such as local nature reserves. Local socio-economic value (e.g. artisanal fishery).
Very Low	<ul style="list-style-type: none"> Ecological receptor neither common nor abundant locally and no functional dependencies. Ecological receptors with no conservation designation. No immediate socio-economic value.

iii. Impact magnitude

1.3.36 Impact magnitude primarily considers the spatial extent of the impact, the duration of the impact and the amount of change (positive or negative) relative to baseline conditions. Additional factors such as frequency, timing and reversibility will be taken into consideration and reported where appropriate as these factors can contribute towards the sensitivity to an impact of the features that are supported.

- 1.3.37 The predicted amount of change for a given impact is assessed in relation to standardised pressure benchmarks applied in sensitivity assessments (Ref. 1.14).
- 1.3.38 Benchmark thresholds, for example EQS, are applied to trigger further ecological investigation and do not necessarily infer sensitivity of all receptor groups.
- 1.3.39 The duration of the impact is considered in relation to pressure benchmarks and constructions timelines. The construction phase is anticipated to last between 9 to 12 years, impacts during the construction phase are considered short to medium-term whilst impacts that occur (or persist) for longer durations are considered long-term. Pressure benchmarks often consider changes over the course of a year, therefore impacts under one year are considered low duration.
- 1.3.40 Impact magnitude is assessed on a four-point scale: very low, low, medium and high and is outlined in **Table 1.4** below.

Table 1.4: Marine water quality and sediment descriptions of impact magnitude.

Impact Magnitude	Generic Description	Spatial Extent	Amount of Change	Duration
High	Large-scale measurable changes, which are typically permanent or long-duration over most of the study area and potentially beyond.	Changes occur across much of the area of interest and possibly beyond. (e.g. 1,000s of hectares (ha)).	Clear, measurable changes beyond natural variation and exceeds site-specific pressure benchmark.	Long-term or even permanent, more than the (maximum anticipated) 12 year construction period.
Medium	Medium-scale measurable changes over much of the study area. Impacts are not permanent.	Changes occur across a significant proportion of the area of interest (e.g. 100s of ha).	Measurable changes beyond natural variation.	Medium-term temporary impacts, one to 12 years.
Low	Noticeable but small-scale changes over a partial area. Impacts are typically short-term.	A partial spatial area is exposed to changes (e.g. 10s of ha).	Measurable changes within range of natural variation.	Short-term temporary, less than a year.
Very Low	Very small-scale or barely discernible changes, over a small area. Impacts are short-lived.	Very small extent is exposed to changes (e.g. 1ha).	Changes possible but cannot be discriminated from natural background.	Very short-term, e.g. spring-neap cycle or less.

iv. Sensitivity

- 1.3.41 Sensitivity assessments determine the resistance (or tolerance) of a receptor to a pressure and the ability to recover following the cessation of the pressure, termed resilience. Within the context of the **ES**, sensitivity assessments are completed relative to the site-specific magnitude of impacts predicted during construction and operational phases of the development.
- 1.3.42 Sensitivity is assessed on a four-point scale: not sensitive, low, medium and high. A general guide for sensitivity is provided in **Table 1.5**.

Table 1.5: Guidance for marine water quality sensitivity criteria.

Sensitivity	General Description For Assigning Sensitivity
High	Little or no capacity for resistance, limited or prolonged recovery.
Medium	Low capacity for resistance, low capacity for resilience (e.g. after 10 years).
Low	Moderate resistance to the pressure, moderate capability for resilience (e.g. after 5 years).
Not Sensitive	High capacity for resistance, high capacity of resilience (e.g. after 1 year).

- 1.3.43 Resistance and resilience descriptors follow the general approach described in **Chapter 6** of this volume.
- 1.3.44 The resistance of a marine water quality and sediment as a supporting receptor is assessed against the predicted impact magnitude. Resistance is evaluated in terms of the extent of water quality change e.g. the degree of exceedance of an EQS or equivalent value and likely extent of effects for associated habitats and species. Nominally the same scale as applied to ecology features is used for water quality but taking account of e.g. inherent chemical persistence:
- None: A severe decline in the extent, density or abundance of the habitat indicated by level of exceedance of EQS or equivalent effects thresholds.
 - Low: A significant decline in the extent, density or abundance of the habitat or species indicated by level of exceedance of EQS or equivalent effects thresholds.

- Medium: A moderate decline in the extent, density or abundance of the habitat or species indicated by level of exceedance of EQS or equivalent effects thresholds.
- High: No or very minor changes in the extent, density or abundance of the habitat or species indicated by level of exceedance of EQS or equivalent effects thresholds.

1.3.45 The resilience of a receptor is assessed in terms of its ability to recover once the pressure is removed and the environment returns to pre-impact conditions. For marine water quality and sediment assessment of resilience primarily considers the chemical/physical changes to water quality and of the return to baseline/background conditions of quality e.g. based on duration of activity/input and local hydrodynamic regime, refreshment rate, tidal currents.

1.3.46 A final cross tabulation of the magnitude of impacts and sensitivity of the receptor provides a guideline for the classification of effects in **Table 1.6** below.

Table 1.6: Classification of effects based on sensitivity of receptors and magnitude of impact.

Impact Magnitude	Sensitivity of Receptor			
	Not sensitive	Low	Medium	High
Very Low	Negligible	Negligible	Minor	Minor
Low	Negligible	Minor	Minor	Moderate
Medium	Minor	Minor	Moderate	Major
High	Minor	Moderate	Major	Major

1.3.47 The definitions of effect for marine water and sediment quality are shown in **Table 1.7**. The tabulation is treated as a guideline and expert judgement must be applied once all the factors of the assessment have been considered and reported.

Table 1.7: Description of Effects Classification.

Value	General Description For Assigning Value
Major	Effects, both adverse and beneficial, that are likely to be important considerations at an international or national level because they contribute to achieving international/national objectives or are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate changes that are likely to be important and could cause subtle changes in other ecosystem features.
Minor	Small changes with limited discernible effects on other ecosystem features. These effects may be raised as local issues but are unlikely to be instrumental in the decision-making process.
Negligible	No discernible changes. An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

1.3.48 Following the classification of an effect as presented in **Table 1.7**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. In general, major and moderate effects are evaluated as significant and minor and negligible effects are evaluated as not significant. However, expert judgement is also applied where appropriate.

f) Topic methodology for Marine Water Quality and Sediment

i. Introduction

1.3.49 During construction of the Sizewell C Project various activities may influence the physical and chemical properties of the marine environment.

1.3.50 In each case the pressures on water quality and sediment are assessed against relevant standards to determine the level of any exceedance and to determine if more detailed modelling is needed.

1.3.51 Where more detailed modelling is indicated this is conducted to provide a spatial and temporal assessment of areas of the marine environment adjacent to the main development site that may be affected.

1.3.52 The results of modelling are used as the basis of information to support decisions for the impact assessment as described.

ii. Sediment standards

1.3.53 During the construction and operational phases of the Sizewell C Project there are several proposed seabed disturbance activities including dredging,

piling installation, anchoring of vessels, vessel movements (tug boat manoeuvring) and scour.

- 1.3.54 Sediments act as a net sink for anthropogenic contaminants in marine ecosystems and contaminated sediments may have a range of toxicological effects on benthic fauna and associated species (Ref. 1.15).
- 1.3.55 There are no statutory thresholds to assess the quality of marine sediment in the UK. However, there are upper threshold limits of sediment contamination which are acceptable for disposal to sea.
- 1.3.56 These contaminant disposal limits are regulated in England by the MMO under the Marine and Coastal Access Act 2009.
- 1.3.57 The aim of these limits is to prevent accumulation of high levels of contamination in offshore sediments and to avoid direct toxic effects on marine flora and fauna.
- 1.3.58 Levels of contamination in dredged sediment are assessed against Centre for Environment, Fisheries and Aquaculture Science (Cefas) Action Levels (Ref. 1.9). The Canadian Interim Sediment Quality Guidelines (Ref 1.16), although not specific to the UK, are commonly also used to provide supporting information for assessment of sediment quality.
- 1.3.59 In the UK there are no standards for levels of suspended sediment in transitional and coastal waters.
- 1.3.60 The Marine Life Information Network (MARLIN) (Ref. 1.14) identified benchmark definitions of change in suspended particulate matter that are used as supporting information for WFD assessment of nutrient status of a waterbody (Ref. 1.10).
- 1.3.61 There are four WFD waterbody ‘types’ defined by annual mean concentration of suspended particulate matter, see **Table 1.8**. The benchmark for suspended sediment is a change from one waterbody type for a period of one year.

Table 1.8: Criteria for identifying types of transitional and coastal water to which the dissolved inorganic nitrogen standards apply.

Type	Annual Mean Concentration Of Suspended Particulate Matter (mg/l)
Very turbid	>300
Turbid	100 - 300
Intermediate turbidity	10 <100
Clear	<10

iii. Nutrient standards

- 1.3.62** During construction, commissioning and operation there are several processes that have the potential to discharge nutrients to the marine environment.
- 1.3.63** The major potential concern for increased inputs of nutrients mainly nitrogen (nitrate) and phosphorus (phosphate) is the enhanced growth of attached and planktonic plants which if it reaches excessive levels can lead to oxygen depletion.
- 1.3.64** For this reason, under the WFD, dissolved inorganic nitrogen (DIN) thresholds are set for classification of WFD waterbodies.
- 1.3.65** The assessment of nutrient status considers waterbody turbidity as more turbid waters limit light penetration and the depth within which phytoplankton can readily grow.
- 1.3.66** So, in more turbid conditions a higher DIN threshold may be considered to represent good status as it is less likely to result in undesirable increases in plant growth relative to a waterbody that is less turbid.
- 1.3.67** **Table 1.9** shows the DIN standards for coastal waters with the intermediate turbidity of most relevance to present conditions within the study area.

Table 1.9: Dissolved inorganic nitrogen standards (micromoles per litre) for coastal waters (salinity 32), or part of such water

Type	High	Good	Moderate	Poor
Clear	12 ¹	18 ¹	27 ¹	40.5 ¹
Intermediate turbidity	12 (168µg/l) ²	70 (980µg/l)	105	157.5
Turbid	12	180	270	405

Type	High	Good	Moderate	Poor
Very turbid	12	270	405	607.5

¹ The standard refers to the concentration of dissolved inorganic nitrogen at a mean salinity of 32 for the period of 1 November to 28 February – for the 'Clear' type the standard is based on the mean but for all other types it is the 99th percentile; ² Values of most relevance to Sizewell C also shown as microgram per litre equivalent. . It should be noted that a more specific methodology for deriving 99th percentile values based on a relationship between SPM and DIN is recommended in draft Environment Agency guidance and for an annual average SPM of 55.2mg/l would give a slightly lower value of 952µg/l as a 99th percentile but the screening here would only slightly change and a full evaluation using a combined phytoplankton and macroalgal model is undertaken to confirm the impact of nutrient discharges on an annual basis.

iv. Dissolved oxygen standards

- 1.3.68** The presence of dissolved oxygen (DO) at high enough levels in all waterbodies including estuaries and coastal waters is essential to the survival and normal functioning of biological communities.
- 1.3.69** Oxygen depletion may occur over different timescales influenced by both seasonal and anthropogenic factors.
- 1.3.70** The solubility of oxygen varies with salinity, temperature and pressure and an increase in water temperature will lead to a decrease in oxygen saturation.
- 1.3.71** The other major factor controlling DO concentration is biological activity: photosynthesis produces oxygen while respiration and nitrification consume oxygen.
- 1.3.72** During construction and operation discharges of treated sewage would contribute biochemical oxygen demand as would decaying organic matter that results from discharges of moribund organisms from the FRR system during operation.
- 1.3.73** The WFD threshold for DO is the 5th percentile i.e. that concentration which will be exceeded 95 per cent of the time and values associated to classification status are shown in **Table 1.10**.

Table 1.10: Dissolved oxygen standards for transitional and coastal waters with salinities <35.

Boundaries	High
High	$=7 - (0.037 \times (\text{salinity}))$
Good	$=5 - (0.028 \times (\text{salinity}))$
Moderate	$=3 - (0.017 \times (\text{salinity}))$
Poor	$=2 - (0.011 \times (\text{salinity}))$

v. Microbiological standards

- 1.3.74 The current EU standard to assess microbial pollution in bathing waters involves the enumeration of faecal indicator organisms *Escherichia coli* and intestinal enterococci as indicators of pathogen content.
- 1.3.75 Discharges from sewage treatment during construction and site operation of Sizewell C must ensure that treatment of sewage discharges is at a standard that ensures the compliance of the nearest bathing waters and shellfisheries is not compromised.
- 1.3.76 The standards for bathing water compliance for monitoring points within designated bathing waters are shown in **Table 1.11**.

Table 1.11: Microbiological standards for coastal and transitional waters.

Boundaries	Intestinal ¹ enterococci	Escherichia coli
Excellent	100 ²	250 ²
Good	200 ²	500 ²
Sufficient	185 ³	500 ³

¹ Colony forming units per 100 millilitres; ² Based upon a 95th -percentile evaluation; ³ Based upon a 90-percentile evaluation.

vi. Chemical effects and standards

- 1.3.77 During construction of Sizewell C there will be activities that have the potential to release chemicals to the environment.
- Waste produced in the early phase of construction when no route for marine discharge is available will be tankered off-site.
 - Surface water drainage potentially containing contaminants from construction processes.
 - Effluent from potable supply and from the treatment of sewage (grey and black water respectively) by the on-site treatment works.
 - Water containing trace levels of various contaminants pumped from both groundwater and excavations during construction dewatering activities.
 - Wash water from cleaning concrete production equipment.

- Wastewater from horizontal cooling water system tunnelling operations (during construction).
- 1.3.78 When the European Pressurised Reactors™ are commissioned, tests will be conducted and conditioning of the entire plant will be undertaken with demineralised water and chemical additives.
- 1.3.79 This process will generate wastewater containing several chemicals that will be discharged through the CDO.
- 1.3.80 During operation of the power station large volumes of cooling water will be discharged through the main cooling water system.
- 1.3.81 Waste chemicals from various operations will contribute to the discharge as will chlorine produced oxidants and by-products resulting from chlorination of the system to prevent biofouling.
- 1.3.82 As for the construction discharge the mixing zone within which there is exceedance of any given EQS, or derived Environmental Assessment limit must be sufficiently limited.
- 1.3.83 Under the WFD, chemical status is assessed by compliance with environmental standards for priority chemicals and other substances that are listed in the European Council Environmental Quality Standards Directive (2008/105/EC) as amended by Directive 2013/39/EU (implemented by the WFD (Standards and Classification) Directions (England and Wales) 2015) which increased the list of priority chemicals to 45.
- 1.3.84 Chemical status is recorded as 'good' or 'fail'. The chemical status classification for the water body is determined by the worst scoring chemical.
- 1.3.85 For the Sizewell C Project, the relevant priority substances are cadmium, lead, mercury and nickel. EQS are determined at the European level, and these apply to all Member States.
- 1.3.86 For other substances, standards may be derived by each Member State, and they should lay down, where necessary, rules for their management. This list of compounds or specific pollutants is defined as substances that can have a harmful effect on biological quality, and which may be identified by Member States as being discharged to water in 'significant quantities'.
- 1.3.87 For the Sizewell C Project, the relevant specific pollutants are unionised ammonia, arsenic, chromium (VI), chlorine, copper, iron and zinc.

- 1.3.88 EQSs are concentrations below which a substance is not believed to be detrimental to aquatic life. To provide a safety factor, the EQS is set substantially below the concentration observed to have a toxic effect on selected test organisms.
- 1.3.89 In the absence of EQS values for some toxic chemicals, the use of PNEC values has been used. PNEC values have only been used where there is no existing EQS standard and where a relevant saltwater PNEC standard has been determined by independent authorities as recommended in Common Implementation Strategy (CIS) Guidance (Ref. 1.11) and EU Technical guidance (Ref. 1.12).
- 1.3.90 The determination of PNEC values follow the European Union Technical Guidance Document (Ref. 1.12) on risk assessment of new and existing chemicals following a review of the ecotoxicological literature. Under the guidelines from the WFD and the EQS Directives, WFD EQS values are, for the most part, also based on PNEC values.
- 1.3.91 A review of PNEC values for several discharge chemicals has already been undertaken by EDF based on PNEC values determined by independent research organisations (e.g. INERIS). This document proposes acute and chronic PNEC values for hydrazine, morpholine and ethanolamine and is presented in **Appendix 21F** of **Volume 2** of the **ES**. These derived PNEC values have been adopted in the assessment.
- 1.3.92 Depending on the release pattern of a chemical and its environmental fate, chemical exposure may occur over long periods - or even continuously - in biota, in sediments, and in the water column. In the water column, exposure may also occur intermittently for short periods e.g. coinciding with storm events or short periods of chemical use.
- 1.3.93 To cover both long- and short-term effects resulting from exposure, two water column EQSs will normally be required:
- a long-term standard, expressed as an annual average concentration and normally based on chronic toxicity data; and
 - a short-term standard, referred to as a maximum acceptable concentration which is based on acute toxicity data.
- 1.3.94 Annual average data are usually based on taking the lowest chronic ecotoxicological value. The values derived for chronic PNEC are usually based on a No Observed Effect Concentration (NOEC) and are the chemical concentrations for which it is predicted that there will be no effect on aquatic

biota or where this is not available an effect concentration for 50% of the test individuals (EC_{50}).

- 1.3.95 A safety factor is then applied by dividing with an assessment factor (1 to 10,000) depending on the quality, quantity, diversity, and specificity of the ecotoxicological data available as set out in CIS guidance and the European Union Technical Guidance Document (Ref. 1.11 and Ref. 1.12).
- 1.3.96 For exposures resulting from shorter term (typically over 24 hours), exposure maximum acceptable concentration values are derived from the lowest acute toxicity data and use 50% effect concentrations (EC_{50}) derived from studies of 24 - 96 hours duration.
- 1.3.97 WFD EQS standards for substances potentially discharged during the construction period but also of relevance to other phases of development including operation are shown in **Table 1.12**.
- 1.3.98 During construction tunnelling for establishment of two subterranean intake tunnels and one outfall tunnel will be conducted using tunnel boring machines (TBM).
- 1.3.99 Soil conditioning chemicals may be required for the TBM process and chemical selection and application rates are currently based on representative scenarios planned for Hinkley Point C¹ for which substance EQS data are shown in **Table 1.13**.
- 1.3.100 The underlying geology at the main development site differs from Hinkley Point C and a bentonite slurry tunnelling method is anticipated for the Sizewell C cooling water tunnels. Bentonite is a clay mineral regularly used in construction and offshore drilling operations. Bentonite is included on the OSPAR list of PLONOR substances (pose little or no risk to the environment). It has no established quality criteria.

¹ A detailed chemicals assessment was made for Hinkley Point C once the ground conditions and associated conditioning chemicals were known. A similar process will be required for Sizewell C but for the purposes of this assessment those same chemicals have been used as indicative (**Appendix 21E of Volume 2 of the ES**).

Table 1.12: Marine water environmental quality standards (EQS) (Directive 2013/39/EU) (Ref.1.17); and microbiological standards from bathing water regulations (2013. No. 1675) (Ref. 1.18).

Determinands	WFD EQS Annual Average Values	WFD EQS Maximum Allowable Concentration (MAC) Values (as 95 percentile) (µg/l)
Cadmium and its compounds (dissolved)	0.2	1.5
Lead and its compounds (dissolved)	1.3	14
Mercury and its compounds (dissolved)	-	0.07
Nickel and its compounds (dissolved)	8.6	34
Chromium VI (dissolved)	0.6	32
Arsenic (dissolved)	25	Not applicable
Copper (dissolved)	3.76 (2.677 x ((DOC/2) - 0.5)) µg/l dissolved, where dissolved organic carbon (DOC) > 1 mg/l	Not applicable
Iron (dissolved)	1000	Not applicable
Zinc (dissolved)	6.8 (plus ambient background 1.1 in salt water)	Not applicable
Boron	7000 ¹	Not applicable
Unionised ammonia (NH ₃)	21	-
Winter dissolved inorganic nitrogen	Not applicable	980 ²
<i>Escherichia coli</i>	Not applicable	≤500 colony forming units/100ml ³
Intestinal enterococci	Not applicable	≤200 colony forming units/100ml ³

¹ (Ref. 1.19); ² It should be noted that a more specific methodology for deriving 99th percentile guidance Good standard value based on a relationship between SPM and DIN is recommended in draft Environment Agency guidance and for an annual average SPM of 55.2mg/l would give a slightly lower value of 952µg/l as a 99th percentile but this would only slightly change screening assessment and definitive assessment is made using a combine phytoplankton macroalgal model. (Ref. 1.10). ³ Good standard for bathing waters (Ref. 1.18).

Table 1.13: Proposed PNEC values for surfactant chemicals for use in tunnelling based on HPC plans.

Conditioning Product	Estimated Discharge Concentration Of Active Substance (mg/l)	Saltwater AA EQS (µg/l)	Source Ecotoxicological Value Used To Derive PNEC Values
BASF Rheosoil 143	23.13	40	Study data (Ref. 1.20)
CLB F5 M	7.71	35	Study data (Ref. 1.21)
Ethoxylated sulphates	7.71	4.5	Study data (Ref. 1.20)

1.3.101 As freshwater organisms are generally easier to obtain and test, this has led to fewer marine toxicity datasets being available. This often leads to the development of marine PNEC values based on extrapolation from freshwater PNEC values or high assessment factors applied to marine ecotoxicological data (uncertainty regarding the sensitivity of other taxa).

1.3.102 Several studies in recent years indicate that this approach is probably particularly precautionary (Refs. 1.22, 1.23, 1.24 and 1.25).

1.3.103 For example, the derivation of PNEC values for hydrazine is based on the lowest valid ecotoxicological value: an EC50 (50% effect on test species) value of 0.4µg/l for the marine alga *Dunaliella tertiolecta*. To derive the chronic PNEC value an assessment factor of 1000 was applied because of the lack of studies available for other marine taxa. An assessment factor of 100 was applied to this EC50 value to obtain the acute PNEC value.

1.3.104 For the assessment of the Sizewell C discharges of hydrazine, morpholine and ethanolamine that may occur during commissioning and operation the chronic PNEC value has been applied to annual chemical loadings and the acute PNEC values to 24-hour discharges and these are shown in **Appendix 21E** of **Volume 2** of the **ES** and in **Table 1.14**. Ethanolamine is the primary choice for pH control and was taken forward for screening.

Table 1.14: Proposed PNEC values for chemical parameters used in commissioning based on EDF Energy R&D review of ecotoxicity studies (see detail Appendix 21F of Volume 2 of the ES).

Chemical Parameter	Acute Marine PNEC µg/l	Chronic Marine PNEC µg/l	Lowest Ecotoxicological Value Used To Derive PNEC Values
Hydrazine	0.004	0.0004	EC50 = 0.4µg/l <i>Dunaliella tertiolecta</i> (marine unicellular alga) – chronic and acute PNEC
Ethanolamine	160	160	NOEC = 1.6mg/l on <i>Microcystis aeruginosa</i> (freshwater cyanobacteria) – chronic and acute PNEC

- 1.3.105** For substances used in water treatment applications in producing demineralised water and that are likely to be discharged during operation, PNEC values were derived from studies sourced from other national assessments and scientific literature. See **Table 1.15** for details.
- 1.3.106** EDF Energy's operational policy for its existing UK fleet is to continuously dose during the growing season to achieve a Total Residual Oxidant (TRO) dose of 0.2mg/l in critical sections of the Cooling Water plant and at the inlet to the condensers. Chlorination would be applied when water temperatures exceed 10°C (Ref. 1.26).
- 1.3.107** A 95th percentile standard is derived for chlorination of seawater based on the formation of TRO and this is shown in **Table 1.16**.
- 1.3.108** Chlorination of the cooling water would also lead to production of chlorination by-products, a key one of which is bromoform for which a derived standard (Ref. 1.27) is also shown in **Table 1.16**.
- 1.3.109** Several chemicals present within the expected marine discharges during the commissioning and operational phases of Sizewell C have no assigned saltwater EQS values that are at present accepted and are naturally present in marine waters (e.g. aluminium, lithium hydroxide, suspended solids, phosphorus, biochemical oxygen demand).
- 1.3.110** Review of other screening assessments concerning marine discharges indicates that it is appropriate to use an ambient mean baseline concentration as a substitute benchmark value.
- 1.3.111** Substitute benchmark water quality standards are based on the overall average values determined from the water quality monitoring undertaken during 2010, **Appendix 21B** of **Volume 2** of the **ES** and in some cases from

the supplementary studies during 2014/15, provided in **Appendix 21C** of **Volume 2** of the **ES**. See background values **Table 1.16**.

Table 1.15: Derived PNEC values, source and type of endpoint with application factor by which they were derived and used in the assessment of water demineralisation chemicals (sequestering agents and by-products) for the operational assessment (Appendix 21F).

Chemical	Acute Marine PNEC µg/l	Basis of Derivation MAC Equivalent Value	Chronic Marine PNEC µg/l	Basis of Derivation AA Equivalent Value
ATMP	74	Factor 1000, 3 acute tests but made same as chronic	74	Factor 100, 3 chronic tests different taxa
HEDP	13	Factor 1000, 3 acute tests but made same as chronic	13	Factor 100, 3 chronic tests different taxa
Acetic Acid	301	Factor 1000 as 3 acute tests different taxa	62.8	Factor 500, 2 chronic tests different taxa
Phosphoric Acid	200	Factor 1000 as 3 acute tests different taxa	20	Factor 10000, 3 acute tests different taxa
Sodium Polyacrylate	180	Factor 1000 as 3 acute tests different taxa	11.2	Factor 500, 2 chronic tests different taxa
Acrylic Acid	1.7	Factor 100 3 acute tests different taxa and extra marine data	0.34	Factor 500, 2 chronic tests different taxa
Morpholine	28	Factor 1000 as 3 acute tests different taxa	17	Factor 100, 3 chronic tests different taxa

Table 1.16: Marine water quality standards applied in assessment of planned discharges during the Sizewell C project – these represent Environmental Quality Standards (EQS) for other surface waters (Transitional and Coastal Waters) and derived PNEC values, for the Operational phase at Sizewell C, Appendix 21F of Volume 2 of the ES.

Determinands	WFD EQS Annual Average Values µg/l	WFD EQS Maximum Allowable Concentration (MAC) Values (as 95 th percentile) (µg/l)
TRO	-	10
Bromoform	-	5
Boron ¹	7000	-
Lithium hydroxide (Lithium)	65 ²	-

Determinands	WFD EQS Annual Average Values µg/l	WFD EQS Maximum Allowable Concentration (MAC) Values (as 95 th percentile) (µg/l)
Phosphates (PO ₄ -P)	33.5 ²	-
Suspended solids	74000 ²	-
Biochemical oxygen demand	2000 ²	-
Aluminium	12 ²	-

¹ Variable dissociation products of Boric acid and other boron compounds in seawater so assessment focuses on equivalent boron concentration; ² Values all based on background mean concentration.

vii. Approach to screening assessment construction discharges

- 1.3.112** As part of a surface water risk assessment (as referenced in Clearing the Waters for All (Ref. 1.28)), the concentration of substances present in the discharge must be assessed against a list of specific pollutants and their EQS.
- 1.3.113** Initial screening tests (historically referred to as H1 tests) were conducted to determine if the concentrations of priority substances and specific pollutants in the discharge exceeded their respective EQS.
- 1.3.114** For any substances that breach the EQS in the initial screening tests (Test 1) a further screening test is applied that takes account of initial dilution upon discharge (Test 5).
- 1.3.115** The Environment Agency Test 5 screening applies to the discharge from the CDO because the discharge is to the subtidal environment and beyond 50m from mean low water spring (MLWS) tidal level. Separate guidance is provided for assessment of large cooling water discharges that would occur during operation, see section ix of this document for operational discharges.
- 1.3.116** Screening Test 5 calculates the effective volume flux for the discharge which is compared to an equivalent value derived for the local site at which the discharge occurs:
- The Effective Volume Flux of the discharge (EVF) is defined as $EVF = (EFR \times RC) / (EQS - BC) \text{ m}^3/\text{s}$.
 - Where EFR = effluent discharge (m³/s); RC = release concentration of the priority substance of concern (µg/l); EQS = EQS (AA) of the substance of concern (µg/l); BC = mean background concentration at the discharge location (µg/l).

- The effective volume flux is compared to a value termed the allowable effective volume flux which references the discharge depth and this value can be up to a maximum of 3.5 metres (m).
 - For Sizewell C, the discharge depth for construction relative to chart datum is greater than 3.5m therefore 3.5 is the allowable effective volume flux used for comparison.
- 1.3.117 When calculating summary statistics for all substances, any values below the method detection limit were adjusted to a value equal to the detection limit.
- 1.3.118 For metals, modelling tests use both total and dissolved concentrations to assess potential deterioration of surface water quality. The total concentration of substances is used in the initial screen and in subsequent modelling to take account of uncertainty regarding the partitioning of substances into the dissolved phase as the groundwater or other discharges mix with the seawater.
- 1.3.119 The assessment includes the screening of the source terms against the saltwater EQS values presented in Water Framework Standards and Classification Directions (Ref. 1.10).
- 1.3.120 For the groundwater discharges, only dissolved concentration data were available, but this assessment uses 95th percentile discharge concentrations for each of the substances of potential concern as this excludes anomalously high values while still providing a robust assessment.
- 1.3.121 During the construction period the CDO will be the primary discharge point.
- 1.3.122 During different parts of the construction period discharges may include groundwater, sewage and tunnel wastewater that contribute sources of metals, nutrients, unionised ammonia and tunnelling chemicals.
- 1.3.123 A series of potential scenarios or cases are used in the assessment for which each of these sources is at a maximum level and these are assessed using the previously described screening methodology (as described in **Appendix 21 of Volume 2 of the ES**).
- 1.3.124 Chemical inputs exceeding relevant EQS values in screening tests 1 and 5 are further evaluated using more detailed modelling.
- 1.3.125 During construction and commissioning various discharges may occur individually and in combination via the CDO. Maximum metals discharges for groundwater were assessed and arsenic, cadmium, copper, mercury, iron

and lead met the screening criteria and passed the assessment and zinc and chromium were taken forward for modelling.

- 1.3.126 Construction inputs of cadmium and mercury were also assessed in terms of total annual load contributions and these met acceptable load criteria.
- 1.3.127 Ammonia, DIN and phosphate are present in groundwater, treated sewage and commissioning discharges. Nitrogen and phosphorus can contribute to enhanced growth of marine phytoplankton and macroalgae, so further modelling is considered for these inputs. Combined sources of ammonia can contribute to unionised ammonia with the amount dependent on local physicochemical conditions so the total ammonia input during construction was taken forward for further modelling.
- 1.3.128 Chemical use for TBM operation did not pass screening for the representative chemicals that were assessed so these are taken forward for modelling assessment. Predicted residual concentrations of bentonite if a slurry tunnelling method is employed were also modelled.
- 1.3.129 Microbiological inputs from treated sewage effluents during construction are also taken forward for modelling assessment to confirm compliance against bathing water standards.

viii. Approach to screening assessment commissioning discharges

- 1.3.130 No operational cooling system will be available for the disposal and dilution of commissioning phase effluents during the cold flush testing stage for the first unit to be constructed during the phased development of the Sizewell C Project site. Therefore, the only available discharge route for this wastewater stream will be through the CDO.
- 1.3.131 Chemical discharges during commissioning are evaluated using the screening methodology described for construction using Test 1 and Test 5.
- 1.3.132 The chemicals discharged during commissioning are unionised ammonia which is assessed in terms of toxicity and with respect to its nitrogen contribution, phosphorus also assessed for its influence on nutrient status and ethanolamine and hydrazine.
- 1.3.133 Predicted ethanolamine loadings during commissioning passed screening assessment. Use of morpholine during commissioning is not expected and therefore not assessed further.

1.3.134 Nitrogen and phosphorus can contribute to enhanced growth of marine phytoplankton and macroalgae, so further modelling is considered for these inputs. Combined sources of ammonia can contribute to unionised ammonia with the amount dependent on local physicochemical conditions so the total ammonia input during commissioning was taken forward for further modelling with total loads from combined construction and commissioning inputs considered.

ix. **Approach to screening assessment operational discharges**

1.3.135 Potential discharges to the marine environment have been assessed for the operational phase of the Sizewell C Project. For large cooling water discharges that are discharged to estuaries or coastal waters a specific screening assessment for chemical discharges recommended by Defra and the Environment Agency (Ref. 1.28) is applied.

1.3.136 Substances likely to be discharged in the cooling water are assessed as follows:

- average background concentration for substance multiplied by average cooling water flow (to determine background load);
- average load of substance in process stream added to above load;
- divide step (ii) result by total of average cooling water discharge volume and average process stream volume combined; and
- compare result to the EQS annual average.

1.3.137 A second assessment makes a comparison to the relevant EQS maximum acceptable concentration:

- maximum background concentration for substance multiplied by minimum cooling water flow (to determine background load);
- maximum load of substance in process stream added to above load;
- maximum load of substance in process stream added to maximum background load;
- divide combined maximum load result by total of minimum cooling water discharge volume and average process stream volume combined; and
- compare result to the EQS maximum acceptable concentration.

1.3.138 Various substances used or produced during operation and discharged via the cooling water system met the discharge screening assessment criteria i.e. those included in **Table 1.14, 1.15, 1.16** (details provided in the Water Framework Directive (Standards and Classification; details Ref. 1.10). TRO from seawater chlorination, bromoform, hydrazine all failed screening assessment and are taken forward for modelling.

1.3.139 Nitrogen and phosphorus discharges during operation can contribute to enhanced growth of marine phytoplankton and macroalgae, so further modelling is considered for these inputs.

1.3.140 Microbiological inputs from treated sewage effluents during operation are also taken forward for modelling assessment to confirm compliance against bathing water standards.

1.3.141 Thermal elevation of the cooling water discharge was taken forward for modelling assessment as it represents a major change to seawater physical quality and can also influence chemical behaviour.

x. Chemical modelling for construction and commissioning discharges

1.3.142 The release and mixing of substances in the construction discharge was modelled using CORMIX US EPA supported mixing zone model (CORMIX (Ref. 1.29) and the validated Sizewell curvilinear General Estuarine Transport Model.

1.3.143 CORMIX is used to predict the rate of chemical plume dilution and plume geometry from the CDO.

1.3.144 The General Estuarine Transport Model is a 3D hydrodynamic model (Ref. 1.30) with an inbuilt passive tracer to represent relevant substances in the discharge. As a conservative case, it was assumed that there was no loss of dissolved metals due to sediment absorption or biological uptake. Using these assumptions, concentrations can be scaled, as the modelled concentration was simply a function of dilution.

1.3.145 The General Estuarine Transport Model setup, calibration and validation are described in more detail elsewhere (BEEMS Technical Report 229: Sizewell thermal plume modelling: GETM Stage 1 Validation and Calibration; Ref. 1.30). The surface is forced with re-analysed data from a meteorological model (ERA40 interim a global atmospheric analysis from European Centre for Medium-Range Weather Forecasts). The boundary conditions were forced by the Danish Maritime Safety Administration operational forecasting models, as described.

- 1.3.146 For the construction phase the proposed discharge is a low volume of groundwater, treated sewage effluent and tunnelling waste with concentrations of some contaminants exceeding EQS levels.
- 1.3.147 The location and basic properties of the proposed discharge are shown in **Table 1.17** below.
- 1.3.148 In this study, the General Estuarine Transport Model domain used a discrete grid with dimensions of 25m by 25m (at its finest resolution) and 21 vertical layers in a sigma co-ordinate system in which the layer thickness changed with water depth.
- 1.3.149 The discharge flow during construction and commissioning was small compared with the total volume in the model grid cell, so to avoid excessive initial dilution, the discharge was made into the model surface layer, which is consistent with the results of the near field CORMIX modelling of a buoyant plume.
- 1.3.150 It should be noted that in a buoyant plume with a discharge in an offshore location, unless mixing occurs, there will be no impact on seabed features.
- 1.3.151 Consideration of the tidal cycle is useful in understanding the likely modes of impact. When the flood tide is at its strongest (with flow to the south), the discharge plume will initially be buoyant, and will then be advected in a narrow surface streak and mixed down. As mixing occurs the concentration within the streak will rapidly drop. At high water, near slack tide, a pool of the discharged water will form at the surface which will be advected northwards as the ebb tide increases.

Table 1.17: CDO discharge scenarios during different phases of construction at Sizewell C.

Discharge Characteristics	Value
Location OSBG	647980 E 264340 N
Charted water depth (surface to bed) at discharge location	At least 4.0 m
Discharge flow	Varies with Case
Discharge salinity	1 PSU

xi. Thermal effects and standards

1.3.152 During the operation phase the primary change to the characteristics of discharged cooling water will be an increase in temperature. The main potential concerns over the thermal plume generation are related specifically to impacts upon species in the water including those that are prey species. The potential effects of a thermal plume are predominantly:

- acute effects – lethal effects where temperatures approach critical thresholds for survival of a species (most likely close to parts of the cooling water system where rapid temperature increase occurs); and
- chronic effects – long term effect on biological processes (e.g. growth, reproduction) where the concern is elevation of mean temperatures.

1.3.153 In addition, as fish can actively avoid areas of high temperatures, if they so choose, it is necessary to consider:

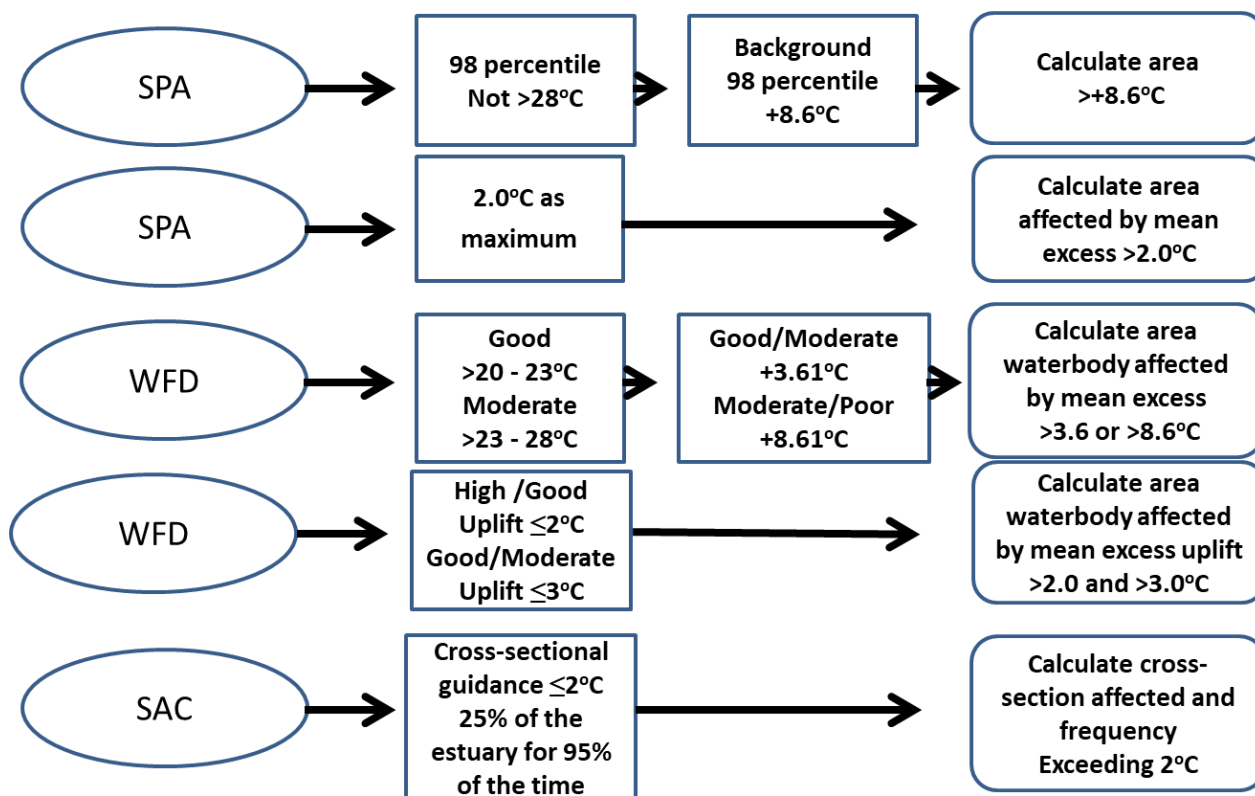
- Any potential thermal barriers to fish migration and the linked concern about the potential displacement of fish prey out of marine bird foraging ranges.

1.3.154 In 2006 an Environment Agency advice note Water Quality Technical Advisory Group (WQTAG) 160, “Guidance on assessing the impact of thermal discharges on European Marine Sites” which is cited in Turnpenny, and Liney’s “Review and development of temperature standards for marine and freshwater environments” (Ref. 1.31) recommended interim thermal standards for assessing SAC/SPA sites in estuarine and coastal sites under the Habitats Regulations based upon standards contained within the Freshwater Fish Directive.

1.3.155 For a SPA these guidelines state that the annual mean water temperature uplift should not exceed 2°C at the edge of the mixing zone.

- 1.3.156 There are currently no uniform regulatory standards in place to control thermal loads in transitional and coastal waters (Ref. 1.32). To be protective of the most sensitive species, thermal standards have, therefore, been set on an indicative basis. As such, they act as triggers for further investigation of potential ecological effects.
- 1.3.157 SAC thermal recommendations include a maximum allowable 2°C thermal uplift (100th percentile) above ambient at the edge of the mixing zone.
- 1.3.158 Furthermore, SACs designated for estuarine or embayment habitat and/or cold-water salmonid species apply absolute temperature thresholds of 21.5°C as a 98th percentile (Ref. 1.33).
- 1.3.159 These criteria are not applicable to the southern North Sea SAC designated for harbour porpoise. Absolute temperature thresholds for marine mammal sensitivity assessments consider SPA thresholds (28°C as a 98th percentile). Thermal thresholds are provided in **Plate 1.1** below.

Plate 1.1: Summary temperature standards using the General Estuarine Transport Model Sizewell model. for 98% baseline temperature value of 19.39°C for Suffolk coastal waterbody using monthly means for Sizewell 2009 – 2013.



xii. Model selection and setup for thermal assessment

- 1.3.160 For the development of new nuclear build power stations that use and discharge cooling water to the environment it is necessary to establish hydrodynamic models to predict the impact of the discharged thermal and chemical plumes on a variety of sensitive ecological receptors.
- 1.3.161 The Environment Agency has produced draft guidelines (Ref. 1.34) which are complemented by the independent BEEMS Expert Panel guidance provided, “Methods for the measurement and modelling of power station cooling water plumes, Edition 2” (Ref. 1.35).
- 1.3.162 Modelling was undertaken using the validated Sizewell General Estuarine Transport Model (Ref. 1.13) and looked at indicative locations for the outfall to determine the extreme scenario for thermal effects. The modelling also assumed that Sizewell B would be operational until at least 2035 and,

therefore, this is accounted for (as part of the baseline) in the results of the assessment.

- 1.3.163 To meet the Environment Agency guidelines two different hydrodynamic models (Delft3D and General Estuarine Transport Model) setup by two independent subcontractors, Bolding and Burchard (General Estuarine Transport Model) and ABPmer (Delft3D), were used to predict the temperature changes off Sizewell that may result from different Sizewell C power station cooling water intake and outfall combinations.
- 1.3.164 Evaluation and quality assurance of the modelling results was performed by Cefas at each stage of the process before the next stage is undertaken. Both models (performed by Bolding and Burchard and ABPmer, respectively) were successfully used for modelling of the proposed Hinkley Point C power station.
- 1.3.165 The relative strengths and limitations of these models are well understood by Cefas and the respective model performances were subject to regulatory scrutiny as part of the consultation on the Hinkley Point C planning and permit applications, as well as for the Sizewell C Project applications.
- 1.3.166 The two models are different in many ways; the principal differences being the heat loss schemes. The Delft3D model uses an excess temperature model, where the heat loss is primarily a function of the initial temperature rise and the wind speed. The General Estuarine Transport Model uses meteorological forcing to consider total heat loss and gain and a reference run without the power station is subtracted from the original run with the power station to calculate excess temperatures in the plume.
- 1.3.167 The Delft3D model is not able to simulate long runs nor variable meteorology and thus shorter runs, over neap and spring tidal periods with selected, fixed meteorological conditions have been performed. These data have been averaged to investigate mean plume properties over a spring – neap cycle.
- 1.3.168 The General Estuarine Transport Model has been implemented to run on a multi-processor parallel cluster and because it is using hindcast meteorological forcing it is able to simulate real weather events which means that it can be used to test scenarios incorporating meteorological extremes that can have a substantial influence upon the model predictions.
- 1.3.169 The Environment Agency guidelines suggest that a representative year should be modelled. Selection of the year was made by examination of the inshore temperature network data managed by Cefas (Ref. 1.36) for Sizewell

C. The data are supplied by EDF Energy and are recorded at the inlet to the Sizewell B condensers. The year 2009 was chosen to be modelled because:

- The mean annual temperature in 2009 was very close to the mean annual temperature 1967-2018; 11.9 °C compared to 11.8°C.
- For the whole year each monthly temperature was within one standard deviation of the 44-year mean (no data are available for 1997).
- Thus, in relation to temperature, 2009 is an average year.

1.3.170 The Environment Agency guidelines also suggest that the modelling year should be representative of the last 10 years. The mean annual temperature in the period 2008-2018 at Sizewell was slightly higher at 12.2°C than the 11.9°C for 2009, but for the critical periods of peak sea temperatures (July and August) 2009 is representative of the decadal mean sea temperature during those months.

1.3.171 Several other differences exist between the two models, the most substantial being the initial selection of the modelling grid. The General Estuarine Transport Model grid is curvilinear which enables high accuracy in the vicinity of the intake and outfall. The model has 21 layers in the vertical and at highest resolution of approximately 20m. The Delft3D model is also setup on a curvilinear grid but with a maximum resolution of 25m around the intakes and outfalls with 8 layers in the vertical.

1.3.172 In conclusion:

- The predicted Delft3D excess temperatures due to Sizewell B alone were lower than the excess temperatures measured at the station.
- For the Delft3D combined Sizewell B and Sizewell C modelling runs, the predicted relative increase in excess temperatures over those predicted due to Sizewell B alone appear reasonable. The predicted values for excess temperatures are, however, significantly underestimated compared with measurements made at the existing Sizewell B station and from considerations of the increase in discharged heat energy.
- The General Estuarine Transport Model excess temperature predictions for Sizewell B alone were higher than those measured at the station but were closer to the measured values than the Delft3D results. The combined Sizewell B and Sizewell C excess temperature predictions appear reasonable compared with measurements made at

the existing Sizewell B station and from considerations of the increase in discharged heat energy.

- It was therefore considered that the General Estuarine Transport Model was more suitable as the primary tool for plume modelling at Sizewell C and that its use would be conservative but not overly so.

1.3.173 The modelling simulations of the thermal plume consider the preferred cooling water configuration (configuration 12) with offshore intakes at I3 and I4 and an offshore outfall at O9 determined from the TR301 study (Ref. 1.37).

1.3.174 An assessment of recirculation of Sizewell C influence on Sizewell B determines that the thermal impact of the Sizewell C discharge falls predominantly upon Sizewell B as an increase in intake temperatures and in the extent of the Sizewell B discharge plume.

1.3.175 For any of the Sizewell C discharge locations studied the amount of recirculation into Sizewell C is minimal. The mean and maximum excess temperatures at the Sizewell B intake decreases as the Sizewell C discharge is moved eastwards.

1.3.176 Sizewell B will be operational until at least 2035 and therefore the modelling undertaken in the study was of the in-combination effect of Sizewell B and Sizewell C.

1.3.177 The modelled Sizewell C cooling water system represented a realistic cooling water configuration with a total of 4 intake heads and 2 outfall heads.

1.3.178 To take account of different power station combinations and operation levels three power station scenarios were considered:

- ZeroReferenceV2: no power stations present.
- ReferenceV2: present day situation with only Sizewell B.
- Conf12: Sizewell C with 4 intake heads and 2 outfalls, all offshore from the Sizewell-Dunwich bank, additionally to Sizewell B.

1.3.179 The General Estuarine Transport Model runs used in this report are listed in **Table 1.17** and described in BEEMS Technical Report 302 “Sizewell Thermal Plume modelling GETM Stage 3 results with the preferred SZC cooling water configuration” (Ref. 1.13).

1.3.180 The three basic configurations were run for one year with meteorological forcing from the European Centre for Medium-Range Weather Forecasts

(ECMRWF) Re-analyses Atmospheric (ERA) model with assimilation of observations, and boundary forcing from a larger scale model domain, which includes wave energy (Ref. 1.30).

1.3.181 The effect of the power stations is evaluated by calculating the difference in temperature between the intended run and the zero reference run, which has no power station discharge. The difference is calculated for each hourly snapshot and the annual mean and the 98th percentile are calculated from this difference.

1.3.182 The 98th percentile was chosen because it is a metric required under HRA and WFD assessment processes.

Table 1.18: Intake and discharge locations for General Estuarine Transport Model runs used in this report (see details Ref. 1.13).

Run ID	Description	Intake Location	Discharge Location	Discharge Flow and Delta T (m ³ /s @ °C)	Time Period
ZeroReferenceV2-annual	Pristine condition	n.a.	n.a.	n.a.	1/1/2009 00:00 - 1/1/2010 00:00
ReferenceV2-annual	Sizewell B	IB ¹	OB ²	51.5 @ 11.0	1/1/2009 00:00 - 1/1/2010 00:00
Conf12-annual	Sizewell B and Sizewell C	IB I3a,I3b ³ I4a,I4b	OB O9a, O9b ⁴	51.5 @ 11.0 125 @ 11.6	1/1/2009 00:00 - 1/1/2010 00:00
Conf12_maint-May	Maintenance at Sizewell C	IB	OB O9a	51.5 @ 11.0 62.5 @ 23.2	1/1/2009 00:00 - 1/1/2010 00:00

¹ Intake for Sizewell B.

² Outfall for Sizewell B.

³ Intakes for Sizewell C (two tunnels each with two intake heads)

⁴ Outfall for Sizewell C (one tunnel with two outfall heads)

xiii. Model selection and setup for chemical discharges during operation

1.3.183 The modelling of cooling water chemical discharges during operation has been undertaken using the validated General Estuarine Transport model of Sizewell used for thermal plume studies and previously described.

1.3.184 The following scenarios were modelled:

- Chlorination of the power station cooling water system to avoid bio-fouling. The TRO resulting from the combination of chlorine and organic

material in the water are modelled using an empirical demand/decay formulation derived from experiments with Sizewell seawater and coupled into the General Estuarine Transport Sizewell model.

- Chlorination by-products. Chlorination of seawater results in a complex series of reactions with reaction products based on bromine chemistry. Bromoform was the only chlorination by-product detected in laboratory experiments on Sizewell seawater. Bromoform loss is modelled in the General Estuarine Transport Sizewell model through volatilization to the atmosphere, with the loss rate a function of the thermal stratification and values obtained from the literature (Ref. 1. 38).
- Addition of hydrazine to control the oxygen concentration in the secondary circuit of Sizewell C. Hydrazine is an oxygen scavenger that would be used to prevent corrosion in the primary and secondary circuits of Sizewell C. Hydrazine is modelled by using an empirical decay formulation derived from laboratory experiments on Sizewell seawater and coupled into the General Estuarine Transport Sizewell model.
- Reduction in DO in seawater due to the warming effect of the discharge plume. The WFD threshold is set as an annual 5th percentile, with high status being > 5.7 mg/l and good status being > 4 mg/l.
- Un-ionised ammonia where concentrations are defined in relation to the annual mean, where the EQS is an annual mean of 21µg/l. The proportion of unionised ammonia is determined by temperature, pH and salinity the values for which were adjusted in the model to evaluate the most conservative assessment including the thermal influence of Sizewell C and Sizewell B.

g) Assumptions and limitations

1.3.185 In several cases the principal limitation on the assessments is that the detailed design and method statements for marine construction and infrastructure are yet to be finalised, which limits the accuracy of predicted environmental impacts. Assumptions are therefore made to envelope the likely most conservative assessments.

1.3.186 The following assumptions have been made:

- Most of the chemical discharge terms will be those proposed for Hinkley Point C, including, sewage effluent contributions to microbial content, dissolved inorganic nitrogen, and unionised ammonia. Also, TBM

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arising and hydrazine. This approach is adopted as there are many elements of the development which are comparable, and plans and details are further advanced for Hinkley point.

- The assessments are based on potential options for chemical selection and use during tunnelling operations and during the commissioning phase.
- Any wastewater arising from tunnelling will be treated with silt-buster or similar and discharged via the CDO.

1.3.187 The following limitations have been identified:

- Tunnelling requirements for chemical use are not defined at this stage and different chemical use and application rate may be required once tunnelling conditions are better defined. This has been covered by inclusion and assessment of extreme scenarios with chemicals identified for tunnelling operations at Hinkley Point C.
- More detail is available on likely chemical presence for commissioning discharges although there is some uncertainty regarding phasing of the commissioning discharge and likely availability of the full cooling water system infrastructure – this has been covered by inclusion of several possible discharge scenarios.

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VOLUME 1, CHAPTER 6, APPENDIX 6R: MARINE ECOLOGY AND FISHERIES LEGISLATION AND METHODOLOGY

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None provided.

1. Marine Ecology and Fisheries Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant marine ecology and fisheries effects of the Sizewell C Project.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in the following **Environmental Statement (ES)** (Doc Ref. Book 6) chapter and documents submitted with the application for development consent:

- **Volume 2, Chapter 22.**
- **Shadow Habitats Regulations Assessment (HRA) marine assessments** (Doc Ref. 5.10).

1.1.3 The marine ecology and fisheries assessments form part of the wider marine discipline assessment and are informed by the results presented in the following **ES** chapters:

- Coastal geomorphology and hydrodynamics assessment presented in **Volume 2, Chapter 20.**
- Marine water quality and sediment assessment presented in **Volume 2, Chapter 21.**

1.1.4 Climate Change impacts, most notably warming sea temperatures, have the potential to act in-combination with impacts from the proposed development and have been assessed for marine ecology receptors as part of the Sizewell C Project wide In-Combination Climate Impact assessment in **Volume 2, Chapter 26** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant marine ecology and fisheries effects associated with the Sizewell C Project.

1.2.2 Legislation and policy have been considered on an international, national, regional and local level and has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International Legislation

i. Habitats Directive

- 1.2.3 The European Council Directive 92/43/ECC on the Conservation of Natural Habitats and of Wild Fauna and Flora was brought into force in 1992. Known as the Habitats Directive, this key piece of legislation ensures European Union (EU) member states fulfil the obligations of the Bern Convention with the aim of restoring natural habitats and maintaining biodiversity. Favourable conservation status of wild species and habitats listed in the Annexes of the Directive are afforded stringent protection. In summary, the Habitats Directive requires member states to adopt an ecologically coherent network of protected sites for habitats and species listed in Annex I and Annex II of the Directive, respectively. Special areas of conservation (SACs) are designated and used in conjunction with special protection areas (SPAs, refer to Birds Directive below) to form a network of Natura 2000 sites. The Habitats Directive requires member states to provide strict protection to species listed in Annex IV of the Directive and management measures are implemented to protect species listed in Annex V of the Directive to prevent exploitation or disturbance. Surveillance of protected habitats and species listed in the Directive is required. The Habitats Directive was transposed into UK law through the Conservation of Habitats and Species Regulations 2010, which have been repealed and replaced by the 2017 Regulations and has effect within 12 nautical miles of the UK coast.

ii. Birds Directive

- 1.2.4 The conservation and management of wild bird populations across Europe is underpinned by Directive 2009/147/EC on the Conservation of Wild Birds, the Birds Directive. The Birds Directive is the means by which the UK and the EU meet the objectives of the Bonn Convention of migratory species and the Bern Convention of conservation of wild species. Vulnerable and rare species listed in Annex I are afforded protection under the Natura network of protected areas through designated SPAs. Migratory species and internationally important wetlands are also protected with SPA designations.

iii. Ramsar Convention

- 1.2.5 The Ramsar Convention on the conservation of wetlands was accepted in 1971 and was ratified into UK law in 1976. Wetlands of international importance are designated Ramsar sites and are afforded the same level of protection as SPAs under the Birds Directive.

iv. [The Oslo and Paris convention for the protection of the marine environment of the north-east Atlantic](#)

- 1.2.6 The Oslo and Paris Convention (1992) seeks to protect the marine environment of the north-east Atlantic through international co-operation. Part of its focus complements ongoing work under the EU Habitats Directive and other international agreements by establishing a list of species, habitats and ecological processes that are threatened and/or declining.

v. [Conservation of Migratory Species of Wild Animals: Bonn 1979](#)

- 1.2.7 The Bonn Convention on the Conservation of Migratory Species of Wild Animals is a multi-governmental agreement for the conservation of species and habitats when migratory routes cross international boundaries. Member countries afford stringent protection measures for endangered migratory species listed in Appendix I of the Conservation of Migratory Species of Wild Animals, and intergovernmental conservation, management and research activities were established to benefit migratory species listed in Appendix II. Within the framework of Conservation of Migratory Species of Wild Animals, the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas was agreed.

- 1.2.8 The Conservation of Migratory Species of Wild Animals was implemented in the UK in 1985 with legal protection for Appendix I species provided by the Wildlife and Countryside Act 1981. In 2000 the Countryside and Rights of Way Act 2000 came into force in England and Wales to enhance protection for threatened cetacean species.

vi. [Agreement on the Conservation of Small Cetaceans of the Balti and North Seas](#)

- 1.2.9 The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas was implemented under the auspices of the Convention of Migratory Species in 1994. The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas provides a means of promoting cooperation across signatory members with the overriding aim of providing favourable conservation status for small cetaceans. The harbour porpoise (*P. phocoena*) is considered a flagship species of the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas programme.

vii. [Conservation of Wildlife and Natural Habitats: Bern 1979](#)

- 1.2.10 The Bern Convention of the Conservation of Wildlife and Natural Habitats (1979) aims to conserve and protect the wild animal and plant species and their natural habitats listed in Appendix I and II of the Convention. Increased cooperation between signatory members is further aimed to mitigate the

exploitation of species listed in Appendix III, which includes migratory species. The Bern Convention is implemented in UK law through the Wildlife and Countryside Act 1981 and the obligations of the Convention are achieved through the EC Habitats Directive.

viii. The Convention on Biological Diversity 1992

- 1.2.11 The Convention on Biological Diversity is a multilateral treaty aiming to develop national strategies for the conservation and sustainable use of biological diversity. The UK Government's first response to the Convention on Biological Diversity was to compile lists of Biodiversity Action Plan (BAP) species and habitats. These lists and subsequent action plans sought to ensure that priority species or habitats are conserved or enhanced.
- 1.2.12 The UK Post-2010 Biodiversity Framework, published in 2012, shifted priorities from BAP to other regulatory and conservation frameworks. BAP lists have been superseded by statutory lists of priority species and habitats under the Natural Environment and Rural Communities Act 2006 (NERC Act).

ix. Water Framework Directive

- 1.2.13 The EU Water Framework Directive (WFD) published in 2000 is the European Union's approach to holistic management of European surface water bodies. The WFD covers groundwaters, lakes, rivers, transitional waters (estuaries and lagoons) and coastal waters up to 1 nautical mile (nm) from low water. The WFD requires EU member states to classify and monitor the quality of waters in designated river basin districts, placing surface waterbodies into one of five ecological classes (high, good, moderate, poor, and bad) and reporting on their monitoring schemes in River Basin Management Plans. Waterbodies are classified by way of hydromorphological criteria, ecological and physico-chemical assessments and the application of environmental chemical standards for priority substances and specific pollutants.
- 1.2.14 Further water quality information relevant to the proposed development is detailed in the Marine Water Quality and Sediment chapter. see **Volume 2, Chapter 21** of the **ES**.

x. Marine Strategy Framework Directive

- 1.2.15 In 2008, the European Union adopted Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy. Known as the Marine Strategy Framework Directive, the Directive aims to implement an effective mechanism to protect the marine environment across Europe and achieve 'good environmental status' by 2020. Achieving good

environmental status will be managed through an ecosystem-based approach for the sustainable use of marine goods and services and human activities. Member states are required to develop a marine strategy to achieve good environmental status and establish a network of marine protected areas. Annex I of the Directive outlines 11 high-level descriptors of good environmental status.

xi. Fisheries-specific international legislation and policy

- 1.2.16 Fisheries management in UK waters is ultimately directed by the EU under the Common Fisheries Policy (Ref. 1.1). The main principles of the Common Fisheries Policy were agreed and implemented in 1983, and the policy was reformed with effect from 1 January 2014 (Ref. 1.2). Common Fisheries Policy regulations extend to conservation, management and exploitation of fisheries resources, aquaculture, and the processing, presentation and marketing of fisheries products.
- 1.2.17 Under the Common Fisheries Policy, catches of quota species must be landed in regulated fisheries of each member state (Ref. 1.3). Specimens of quota species which are below their minimum conservation reference size must be landed and sold for purposes other than direct human consumption (e.g. fish meal, the cosmetics industry, pharmaceuticals, pet food). Some exemptions to the landing obligation apply for species which have a scientifically proven 'high survivability', or are damaged by predators, disease or other contaminants. Furthermore, *de minimis* exemptions that remove the need to land the whole catch apply in certain fisheries which have proven difficulties in improving gear selectivity and/or disproportionate costs in sorting through unwanted components of the catch.
- 1.2.18 The European Commission (EC) Directives and Council Regulations relevant for UK marine fisheries are listed and described in detail in the Marine Management Organisation (MMO) "Blue Book" (Ref. 1.4).
- 1.2.19 In the UK, fishing boat licences are administered by the MMO and give an entitlement to fish and to catch a certain quantity of each of the main commercial species via annual quota allocations, for stocks that are managed under a quota system. Quota management is either via producer organizations (the Lowestoft producer organization, in this case), which have various monitoring and reporting responsibilities, or through "non-sector" quotas managed by Department for Environment, Food and Rural Affairs (Defra) for boats that are not members of producer organizations. The latter situation applies to most of the inshore fleet (generally vessels under 10m in length) that may be severely restricted in catching opportunities for some species for which the national non-sector quota is small or exhausted towards the end of the year.

1.2.20 For many species, fisheries are managed by a combination of quotas, technical measures (e.g. allowable gears and mesh sizes) set through Inshore Fisheries and Conservation Authority (IFCA) bylaws out to 6nm or through the MMO between 6-12nm, and ‘individual minimum conservation reference size’. For some species where the stocks are assessed as unsustainable, additional management measures may be introduced.

1.2.21 Seabass (*Dicentrarchus labrax*) is a high-value species that is of importance to both the commercial and recreational sectors. This is not a quota species but has historically been managed using technical measures and minimum conservation reference size only. Following concerns about the status of the seabass stock in the North Sea, English Channel, Irish Sea and Celtic Seas, the EU introduced additional management measures in 2015, that included a ban on pelagic pair trawling to reduce impacts on spawning aggregations in the Channel, an increase in the minimum landings size and restrictions on recreational catches.

1.2.22 Since 2015, seabass management measures have been further revised, and the current legislation that is applicable to the southern North Sea (and Greater Sizewell Bay area) prohibits commercial seabass fishing in January – March; and sets out catch limits by gear for the remainder of the year. For recreational fisheries, seabass may not be retained in January – March and November – December and there is a bag limit of one fish between April and October (Council Regulation (EU) 2019/124 Article 10).

b) National Legislation

i. Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

1.2.23 The EU WFD was transposed into UK law as The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. To meet the requirements of the WFD, the competent authority (the Environment Agency) has set Environmental Objectives for each water body. By default, the objective in all water bodies is to prevent deterioration in either the ‘ecological status’ (for natural water bodies) or the ‘ecological potential’ (for heavily modified or artificial water bodies). The Suffolk coastal waterbody (code: GB650503520002) directly adjacent to the proposed development is classified as having ‘*moderate ecological potential*’. The current Cycle 2 biological quality element for phytoplankton is classified as ‘*good*’ (Ref. 1.5).

ii. Wildlife and Countryside Act 1981

1.2.24 The Wildlife and Countryside Act 1981 was implemented to meet the obligations of the Bern Convention and Birds Directive and consolidated existing national legislation. The Act makes it an offence to kill, injure or take

any species listed under Schedule 5, including all cetaceans, and prohibits intentionally disturbing animals occupying places used for protection or shelter. Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

iii. Countryside and Rights of Way Act 2000

- 1.2.25 In England the Countryside and Rights of Way Act 2000 provides public access on foot to certain types of land, amends the law relating to public rights of way and strengthens wildlife enforcement legislation. The Countryside and Rights of Way increases measures for the management and protection of sites of special scientific interest (SSSI) and provides for better management of areas of outstanding natural beauty (AONB).

iv. Natural Environment and Rural Communities Act 2006

- 1.2.26 Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 provides the legal duty for UK countries to conserve biodiversity. Under Section 41 (England), lists of priority habitats and species have been compiled. The species and habitats of conservation importance listed under Section 41 of the NERC Act must be fully considered in the decision-making process and measures implemented to avoid, where possible, or mitigate impacts.

- 1.2.27 Species and habitats of conservation importance listed under Section 41 that are present within the Greater Sizewell Bay (GSB) are identified as being 'high value' receptors and considered as 'key taxa' for assessment purposes within the **ES**, as discussed in **Table 1.2**.

v. Marine and Coastal Access Act 2009

- 1.2.28 In 2009, the Marine and Coastal Access Act 2009 became law, creating new management bodies. The Marine and Fisheries Agency became the MMO in 2009, and the regional Sea Fisheries Committees became IFCAs in April 2011.

- 1.2.29 The Marine and Coastal Access Act 2009 introduced new planning and management systems for overseeing the marine environment, most notably through the requirement to obtain marine licences for works within the UK marine area at sea (including the deposition or removal of any substance or object from the sea below mean high water). It created a strategic marine planning system that seeks to promote the efficient, sustainable use and protection of the marine environment, guided by the Marine Policy Statement and a series of Marine Plans (**Section 1.2: ci**). The Act seeks to implement a series of marine conservation zones (MCZs) to sit alongside European

marine sites (SACs/SPAs), SSSIs and Ramsar sites to form an ecologically coherent network of marine protected areas.

1.2.30 The Orford Inshore MCZ was part of the third tranche of MCZs that was formally designated in May 2019. Located approximately 14km offshore from the Alde-Ore Estuary, the site is composed of subtidal mixed sediments that form important nursery and spawning grounds for some species of fish including Dover sole, lemon sole and sand eels. Burrowing anemones, sea cucumbers, urchins, starfish and nationally important shark species are found at the site. The Orford Inshore MCZ is an important foraging area for seabirds and harbour porpoise has also been observed within the site. The protected feature of the site is ‘subtidal mixed sediments’ with a general management approach of ‘recover to a favourable condition’ (Ref. 1.6).

1.2.31 The Marine and Coastal Access Act 2009 provides the framework for a marine licensing system and is administered by the MMO, a statutory consultee within the DCO application process.

vi. [Conservation of Habitats and Species Regulations 2017](#)

1.2.32 The Habitats Directive was transposed into the UK law through the Conservation of Habitats and Species Regulations 2010, which have been repealed and replaced by the 2017 Regulations.

1.2.33 The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations) transpose the EC Habitats Directive and elements of the EU Wild Birds Directive into national law in England and Wales. The Habitats Regulations provide the legislative enforcement for the protection of Natura 2000 sites within the limit of territorial waters (12nm) and protect species and habitats listed in Annex I and II of the EC Habitats Directive. Beyond the 12nm limit, the EC Habitats Directive and elements of the EU Wild Birds Directive are transposed into national law by the Conservation of Offshore Marine Habitats and Species Regulations 2017. Both inshore and offshore, the regulations make it an offence to deliberately capture, injure, kill or disturb any European protected species (EPS) listed in Schedule 2, or to damage or destroy a breeding site or resting place of such an animal. All cetaceans are listed as EPS in Schedule 2.

vii. [Salmon and Freshwater Fisheries Act 1975](#)

1.2.34 The Salmon and Freshwater Fisheries Act 1975 imposes restrictions on the taking and destroying of fish and prohibits the obstruction to the passage of salmon and trout (including sea trout).

viii. Registration of Buyers and Sellers and Designation of Fish Auctions and Site Regulations

- 1.2.35 In 2005, the Registration of Buyers and Sellers and Designation of Fish Auctions and Site Regulations (SI 2005 No. 1605) was introduced to improve the monitoring and control of landings in the UK (Ref. 1.7). All persons engaged in the first sale or purchase of more than 25kg of fish per day (subsequently raised to 30kg in 2013) anywhere in the UK must register as either a buyer and/or seller of fish. This regulation applies to designated ports with registered fish markets and to fish sold under contract between boats and processors and to private sales between skippers, or their agents, and buyers elsewhere, so covering sales of fish on the harbour side or from a fisher's home. However, due to the minimum limit of 30kg per day, there is potential for the landings of small operators that do not land large quantities of fish to be underestimated.

ix. Fisheries specific regulatory requirements

- 1.2.36 Management of inshore fisheries in England falls mainly to one of the 10 regional IFCAs. The Eastern IFCA has responsibility for regulating sea fishery activities from the coast to 6nm offshore between Haile Sand Fort, Lincolnshire in the North, and Felixstowe, Suffolk in the south, encompassing the Sizewell study area. Under Section 6 of The Marine and Coastal Access Act 2009 (Transitional and Saving Provisions) Order 2011, the Eastern IFCA took responsibility for the byelaws made by the Eastern Sea Fisheries Joint Committee and North Eastern Sea Fisheries Committee pertinent to the new Eastern IFCA district.
- 1.2.37 The Eastern IFCA byelaws that specifically apply to fisheries within the Sizewell study area have not been modified or amended since the transition from Eastern Sea Fisheries Joint Committee to Eastern IFCA.
- 1.2.38 Within the Sizewell study area, the Environment Agency is responsible for management of fisheries upstream of any river beyond the highest point to which ordinary tides flow, beyond the road bridges on the A12 at Lowestoft, the A12 across the River Blyth, the B1069 across the River Alde, the A1152 across the River Deben, and the A137 across the River Orwell, and in freshwaters. The Environment Agency is also responsible for sea trout and eel fisheries out to the 6nm limit (although, in effect, the Eastern IFCA manages the coastal sea trout fishery).

c) Policy

i. National Policy Statements

1.2.39 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.8) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.9). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

1.2.40 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.

1.2.41 NPS EN-1 specifies key aspects to the **ES** that the applicant should include:

- The applicant should ensure that the **ES** clearly sets out any effects on internationally, nationally and locally designated sites of ecological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.
- The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests.

1.2.42 The requirements of NPS EN-1 and NPS EN-6 are provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1: 4.8	Climate Change. New energy infrastructure has long operational life cycles and needs to remain operational over the period of multiple decades and in the face of Climate Change.	The influence of warming sea temperatures are considered in relation to thermal discharges and entrainment conditions. The potential for sea level rise to influence benthic communities and habitats is considered in respect to future shoreline scenarios.
EN-1: 5.3	Biodiversity and geological conservation.	Throughout the iterative planning stages engineering options have been sought to implement mitigation

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	<p>The Government's biodiversity strategy aims to halt, and if possible reverse, declines in priority habitats and species and healthy, functioning ecosystems.</p> <p>Applicants should avoid significant harm to biodiversity interests and geological conservation interests, through mitigation and consideration of reasonable alternatives.</p>	<p>measures that have been embedded into the station design to minimise effects on species and habitats. Where appropriate, the ES assesses effects with and without mitigation to allow transparency of the effectiveness of embedded mitigation measures.</p> <p>Additional mitigation measures are considered where significant effects are identified.</p> <p>Identification of priority habitats is central to the ES assessment process. The conservation designations of species and habitats is considered within assessments.</p>
EN-1: 5.3	<p>Mitigation.</p> <p>Appropriate mitigation measures should be included as an integral part of the proposed development. <i>"In particular the applicant should demonstrate that:</i></p> <ul style="list-style-type: none"> <i>• during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;</i> <i>• during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements;</i> <i>• habitats will, where practicable, be restored after construction works have finished; and,</i> <i>• opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals."</i> 	<p>Measures have been sought to minimise environmental impacts throughout the iterative planning process. Primary (embedded) mitigation measures have been integrated into the design of the proposed development to minimise the potential for significant effects. Where additional (secondary) mitigation is required assessments are provided.</p> <p>Environmental best practice has been taken into account and demonstrated through submission of the site Code of Construction Practice (CoCP) (Doc Ref. 8.11). The CoCP sets out the management measures which SZC Co. will require its contractors to adopt and implement during construction to maintain satisfactory levels of environmental protection and limit disturbance from construction activities as far as reasonably practicable (Doc. Ref. 8.11).</p> <p>Examples of enhancing or creating new habitats of value includes the proposal to the final landscaping of the sea defences to enable reinstatement of coastal vegetation.</p>
EN-1: 5.11	<p>Noise</p> <p>Construction and operational noise has the potential to have adverse</p>	<p>Marine receptors are sensitive to the impacts of underwater noise. A detailed underwater noise</p>

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	impacts on wildlife and biodiversity. The impacts of noise should be assessed by the applicant.	assessment has been completed as part of the ES . The assessment details ambient noise levels and describes noise generating activities and the impacts on sensitive marine receptors, notably marine mammals and fish. Mitigation measures are discussed and a Marine Mammal Mitigation Protocol has been submitted as part of the DCO application, Appendix 22N of Volume 2 of the ES .
EN-6 (vol. 1): 3.7	Water quality and resources: mitigation. <i>"In the design of any direct cooling system the locations of the intake and outfall should be sited to avoid or minimise adverse impacts on legitimate commercial and recreational uses of the receiving waters, including their ecology. There should also be specific measures to minimise impact to fish and aquatic biota by entrainment or by excessive heat or biocidal chemicals from discharges to receiving waters."</i>	Embedded mitigation measures are integrated into the design of the proposed development to minimise adverse impacts. Some examples include: <ul style="list-style-type: none"> • locating the cooling water intakes and outfalls 3km offshore in deep water to maximise dilution and minimise plume interaction with that of Sizewell B and intersection with the coast; • utilisation of low velocity side intake heads to reduce initial impingement; • optioneering was undertaken to advise on the location of the fish return and recovery system headworks to reduce the potential for fish re-impingement from, and exposure to Sizewell B chemical plumes; • construction of two un-chlorinated fish return and recovery systems avoiding complex hydraulic junctions or requirement for Archimedes screw, to minimise impacts on impinged fish; and • implementation of seasonal chlorination strategies to reduce effects on entrained biota and reduce seasonal duration of chlorinated discharges.
EN-6 (vol. 1): 3.9	Cumulative effects Potential cumulative ecological effects have been identified by the Appraisal of Sustainability (AoS) for NPS EN-6 at sites in the east of England.	The cumulative impacts of the proposed development with other plans, projects and proposals are also assessed. This assessment is

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	Applicants must consider cumulative ecological effects.	presented in Chapter 4 of Volume 10 of the ES .
EN-6 (vol. 1): 3.9	Biodiversity and geological conservation. The Nuclear AoS identified cooling water abstraction and discharges, habitat and species loss and fragmentation/coastal squeeze, and disturbance events (noise light visual) as potential impacts on biodiversity. Baseline studies should be undertaken on important habitats and species to inform assessments.	The potential impacts identified by the Nuclear AoS are considered in detail in the assessment. Impacts from the proposed development are considered individually and in-combination (inter-relationships).
EN-6 (vol. 2): D10	Access to suitable sources of cooling. The potential for cooling water abstraction to damage fish populations acting in-combination with Sizewell B and cause water quality issues was identified. The applicant should provide detailed modelling of the impacts in relation to the proposed design and mitigation of the station.	Detailed thermal and chemical modelling has been undertaken as part of the assessment process. The design of the Sizewell C cooling water infrastructure was developed using an iterative approach in order to minimise the potential for effects on designated coastal habitats and species. Fish and invertebrate impingement and entrainment monitoring have been completed at Sizewell B over a 9-year period. Predictions have been modelled for Sizewell C with and without impingement mitigation to demonstrate the potential effectiveness of embedded mitigation measures. These assessments form a key component of the ES (Volume 2, Chapter 22) .

ii. Marine Policy Statement

- 1.2.43** The Marine Policy Statement supports maintaining the 11 descriptors of good environmental status detailed in the Marine Strategy Framework Directive.
- 1.2.44** As a general principle, development should aim to avoid harm to marine ecology, biodiversity and geological conservation interests (including geological and morphological features), including through location, mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, then appropriate compensatory measures should be sought. Development proposals may provide, where appropriate, opportunities for building-in beneficial features for marine ecology, biodiversity and geodiversity as part of good design.

- 1.2.45 The descriptors for achieving good environmental status under the Marine Strategy Framework Directive include keeping underwater noise at levels that do not adversely affect the marine environment. Marine Plans will consider how the effects of noise and vibration (as particle motion) on wildlife can be mitigated and minimised taking account of known sensitivities to particular frequencies of sound and consider how significant adverse effects on health can be avoided.

d) Regional

i. East Inshore Marine Plan 2014

- 1.2.46 The East Inshore Marine Plan is intended to be a means of holistic management to deliver the vision of “*clean, healthy, safe productive and biologically diverse oceans and seas*”, under the Marine and Coastal Access Act 2009. The East Inshore Marine Plan area extends from Flamborough Head in the north to Felixstowe in the south with a seaward limit stretching 12nm offshore. The MMO is responsible for the East Inshore Marine Plan, which will form part of the Integrated Coastal Zone Management overseeing the areas’ resources, and the activities and interactions that take place within them and ensure sustainable development.

ii. Eel Management Plans

- 1.2.47 To help recover the sustainability of the eel stocks the European Commission has initiated an Eel Recovery Plan (Council Regulation No. 1100/2007). Eel management plans are a requirement of each member state with the target of achieving 40% of the potential biomass of escapement of silver eels to the spawning population that could be expected in the absence of anthropogenic disturbance. Such disturbances include fishing, barriers to migration and water quality issues. Across England, eel management plans are set at the WFD defined River Basin District level. The proposed development falls under the Anglian River Basin District (Ref. 1.10).
- 1.2.48 The Anglian River Basin District eel management plan identifies the potential for mortalities of adult yellow eels and migrating silver eels following entrainment in pumping stations within the River Basin District. Whilst the proposed development abstracts water from offshore the potential impacts of entrainment / impingement on eel populations is considered. Furthermore, development activities with the potential to act as a barrier (either physical, thermal or chemical) to eel or other migratory fish species is assessed. An Eels Regulations Compliance Assessment has been completed as part of the DCO submission, see **Appendix 22O of Chapter 22, Volume 2** of the **ES**.

iii. Suffolk Shoreline Management Plan

1.2.49 Shoreline Management Plans (SMPs) are applied to individual sediment cells along the coast for the purpose of managing flood and erosion risk during the short, medium and long-term. The SMP relevant to the proposed development is Zone 4, Dunwich Cliffs to Thorpeness.

1.2.50 The plan allows for local management of the main Minsmere frontage but with the long-term aim of managed realignment. The Sizewell power station's frontage has a 'hold the line' policy. Further information including the interaction of the proposed development with the future shoreline is provided in **Volume 2, Chapter 20** of the **ES**.

e) Local

1.2.51 The following local policies are relevant to the marine ecology assessment:

1.2.52 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

1.2.53 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

1.2.54 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

1.2.55 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

1.2.56 Suffolk Coastal District Local Plan July 2013 – policy SP13 lists the assessment of ecological impacts on nearby designated sites as a local issue to be considered by the Council in the local impact report if an application for the Sizewell C power station is submitted.

f) Guidance

1.2.57 Marine ecology methods apply an Ecological Impact Assessment (EclA) based approach to assess the potential effects of the proposed development

on marine ecology receptors following the Chartered Institute of Ecology and Environmental Management (CIEEM) good practice guidelines (Ref. 1.11).

- 1.2.58 The potential effects of the proposed development were identified by applying an activities-pressures matrix following the approach outlined in the Healthy and Biologically Diverse Seas Evidence Group (Ref. 1.12).
- 1.2.59 Methodology for fisheries assessment follows a structured approach primarily based on the guidance document by Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2004), which provides indications of types of impacts to consider (Ref. 1.13). Examples of assessment frameworks from recent commercial fisheries EIA chapters in the North Sea region are also utilised.
- 1.2.60 The marine ecology and fisheries assessments draw on a range of guidance documents including but not limited to chemical standards, underwater noise assessment threshold and mitigation guidelines and cooling water infrastructure best practice guidance. Standards and guidelines applied are detailed in the relevant sections and technical appendices.

1.3 Methodology

- 1.3.1 The generic EIA methodology is detailed in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 This section provides specific details of the marine ecology and fisheries **ES** methodology applied to the assessment of the proposed development to provide appropriate context for the assessments presented in **Volume 2, Chapter 22** of the **ES**.

a) Scope of the assessment

- 1.3.3 Following consultation on the 2019 SZC Co. Stage 3 Preliminary Environmental Information (PEI) (Ref. 1.14) and through engagement with statutory bodies through the Marine Technical Forum, a Marine Ecology and Fisheries Scoping Report was produced, see **Volume 2, Appendix 22M** of the **ES**. The Marine Ecology and Fisheries Scoping Report identified the impacts with the potential to cause significant effects on different receptor groups which require further assessment in **Volume 2, Chapter 22** of the **ES**. Furthermore, the report scoped out, with appropriate justification, activities where the potential to cause impacts exist but the magnitude of the impact was considered too small to warrant further investigation. Comments received from the statutory stakeholders including the MMO, Natural England and the Environment Agency in 2019 have been addressed, with Edition 2 of the Final Marine Ecology and Fisheries Scoping Report appended to the **ES**, refer to **Volume 2, Appendix 22M**.

- 1.3.4 The scope of the assessment has also been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.5 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.6 Following consultation and receipt of the subsequent Scoping Opinion on the original 2014 EIA Scoping Report, see **Appendix 6A** of this volume, assessments were split by receptor groups and include:
- Plankton.
 - Benthic Ecology.
 - Fish Ecology.
 - Marine Mammals.
 - Indirect and Food-web Effects.
 - Fisheries.
- 1.3.7 Receptor specific assessments allow technical specialists and consultees the opportunity to review ecological receptors in self-contained sections of the **ES**. To aid this process, detailed summaries of receptor baseline conditions for each receptor group are provided in the relevant section allowing the assessments to be stand-alone.
- 1.3.8 Assessments are based on development components and consider construction and operational impacts. The development components considered in the marine ecology and fisheries assessments include:
- the coastal defence feature;
 - the beach landing facility;
 - the cooling water infrastructure (intakes and outfalls);
 - the fish return and recovery system; and
 - the combined drainage outfall.
- 1.3.9 Activities associated with each development component have been identified and the relevant pressures with the potential to affect receptors are

assessed. The intention of this structure is to allow rapid identification of the potential for effects for any given development component on receptors of interest.

1.3.10 The potential effects of the proposed development were identified by applying an activities-pressures matrix following the approach outlined in the Healthy and Biologically Diverse Seas Evidence Group (Ref. 1.12). The initial step reviewed the construction and operational elements of each development component to determine the site-specific list of activities. The full list of activities for each development component was cross tabulated with the Oslo and Paris Convention list of pressures (Ref. 1.15). The Oslo and Paris Convention list of pressures were applied to allow a consistent recognisable and defined list of pressures for assessment purposes.

1.3.11 Pressures fall within the overarching themes of:

- hydrological changes;
- pollution and other chemical changes from sediment resuspension or discharges;
- physical loss;
- physical damage;
- other physical damage (e.g. noise and light); and
- biological pressures.

1.3.12 Each overarching pressure theme has a number of specific pressures that were cross-tabulated with the development activities. Cross tabulation allowed a formal means to scope out activities with no pressure pathways and identify potential activity-pressure pathways on a given receptor. The Marine Ecology and Fisheries Scoping Report, refer to **Appendix 22M of Volume 2** of the **ES**, identifies the impacts with the potential to cause significant effects on different receptor groups which require further assessment in the **ES** (Doc Ref. Book 6).

b) Consultation

1.3.13 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. To facilitate engagement with statutory stakeholders on the marine assessments, the Sizewell C Marine Technical Forum was established on 26 March 2014.

- 1.3.14 The Marine Technical Forum has an independent chair, supported by a technical secretariat supplied by SZC Co. together with nominated technical representatives from Natural England, the Environment Agency and the MMO, together with consultants working on their behalf. The Eastern IFCA, Suffolk Country Council and the Royal Society for the Protection of Birds have also been in attendance at marine ecology and fisheries Marine Technical Forum meetings as participating guests.
- 1.3.15 The key aim of the Marine Technical Forum is to provide a means whereby the nature of the marine monitoring at Sizewell and the results and their outcomes can be readily discussed. Agreement or consensus between SZC Co. and the statutory environmental bodies, and clarity on any points of difference is sought. The Marine Technical Forum aims to seek a common view whilst respecting the independence of the statutory environmental bodies so that relevant advice to SZC Co. may be distilled, and that statutory environmental bodies' consultations and decision making may be best informed.
- 1.3.16 In advance of the DCO, the Sizewell C Marine Technical Forum has sought to develop a shared understanding of the status and sufficiency of the marine studies advanced by SZC Co., the assessments of Sizewell C Project impacts based upon these studies and the proposed means of mitigation, in order both to facilitate advice given by its members to the Planning Inspectorate and inform their own procedures.
- 1.3.17 Since November 2018, the Marine Technical Forum has convened on four occasions for marine ecology and fisheries discussions alone. The meetings have focused on the following areas:
- 1st November 2018: Evidence in support of the Stage 3 PEI.
 - 1st – 2nd May 2019: Presentations of assessments for all receptors and updates to underwater noise and dredge modelling assessments.
 - 18th June 2019: Focussed session on impingement and entrainment assessments.
 - 18th December 2019: Sizewell B visit to observe impingement monitoring followed by presentations on updates to impingement and entrainment assessments and *Sabellaria spinulosa* at the site.

c) **Study area**

- 1.3.18 The geographical extent of the marine ecology study area was determined by the potential zone of influence (Zol) for the proposed development.

- 1.3.19** The Greater Sizewell Bay (GSB) forms the initial reference area for marine assessment purposes. The GSB extends from Blyth Piers in the north to the Coralline Crag outcrops near Thorpeness in the south (**Figure 20.1** of **Volume 2** of the **ES**). The seaward boundary extends to the eastern flank of the Sizewell-Dunwich Bank, to include the spatial extent of the proposed cooling water infrastructure. The landward limit is delineated by the mean high water springs (MHWS) tidal mark.
- 1.3.20** The GSB is an open coastal system and water exchanges between the bay and the rest of the southern North Sea. The spatial extent of potential impacts from the proposed development are therefore dependent on the tidal regime and the transmission and persistence of the pressure¹. Zols have been informed by the largest-scale potential impacts associated with the proposed development, these include:
- results from underwater noise modelling during construction activities (impact pilling, dredging, drilling);
 - results from suspended sediment plume modelling associated with dredging and drilling activities; and
 - thermal plume modelling of the in-combination impacts of Sizewell B and Sizewell C cooling water discharges (applying the 2°C mean excess temperature contour at the seabed).
- 1.3.21** The consultation process identified the need to consider receptor specific effects beyond the Zol, particularly for highly mobile species. Effects on marine ecological receptors are dependent on the distribution, mobility and ecology of the species being considered relative to the impact. Therefore, assessments will determine the receptor-specific spatial scale within the ‘impact magnitude’ narrative.
- 1.3.22** The boundary of the study area for commercial fisheries was determined to be the International Council for the Exploration of the Sea (ICES) rectangles accounting for the local fishery (ICES rectangle 33F1) and the regional context (ICES rectangles 32F1, 32F2, 33F2, 34F1 and 34F2). The boundary of the study area for recreational angling from beaches and boats was ICES rectangle 33F1.

¹ Pressures are the mechanism through which an impact may occur. Pressures include chemical or physical changes in the environment, such as chemical discharges or underwater noise. The transmission and persistence of pressures along with features of the physical environment, such as bathymetry and tidal flows influence the Zol.

d) Assessment scenarios

- 1.3.23 The Marine Ecology and Fisheries **ES** assessments consider the construction, commissioning and operational phases of the proposed development. Commissioning considerations, primarily relating to discharges during cold flush testing of the reactors, are considered as part of the construction assessment. A high-level description of the anticipated activities for the decommissioning of the Sizewell C power station, including a summary of the types of environmental effects likely to occur is provided in **Chapter 5 of Volume 2 of the ES**. As discussed in **Chapter 5 of Volume 2 of the ES**, for the decommissioning of the proposed development, it is necessary to obtain prior consent from the Office for Nuclear Regulation and undertake a separate EIA at the time of submission. Therefore, a further assessment of decommissioning will be made based on the available technology, methods of decommissioning, and baseline environmental conditions at the time, following a process of consultation.

e) Assessment criteria: marine ecology

- 1.3.24 As described in **Volume 1, Chapter 6**, the **ES** methodology considers whether impacts of the proposed development would have an effect on resources or receptors. Assessments broadly consider the value of a receptor, the magnitude of impacts relative to baseline conditions and the sensitivity of the receptor to the predicted impact. These criteria are used to classify effects and their significance.
- 1.3.25 Marine ecology methods apply an EcIA based approach to assess the potential effects of the proposed development on marine ecology receptors (Ref. 1.11).
- 1.3.26 The term marine ecology receptor primarily applies to species and habitats. Functional traits, diversity indices or species groups may be assessed as receptor proxies, where appropriate.

i. Receptor Value

- 1.3.27 Baseline characterisations of the study area identified important receptors for assessment purposes. Receptors were selected for assessment based on socio-economic, conservation or ecological value. Common and abundant taxa were also selected for assessment in the **ES (Volume 2, Chapter 22)**. As such receptor value determines the species that will be assessed and may be applied to determining the significance of an ecological effect on a given receptor. For example, an effect may be considered in relation to the conservation objectives of a designated species.

1.3.28 The value of marine ecological receptors has been uncoupled from sensitivity. This allows sensitivity assessments to be undertaken for a given impact independently of value.

1.3.29 The highest scoring value for ecological, socio-economic and/or conservation importance determines the overall value of a receptor, as provided in **Table 1.2**. Receptors with very low value would not be included as key taxa during baseline characterisations and are therefore scoped out of the **ES** assessments.

Table 1.2: Marine ecology receptor value

Value	General Description For Assigning Value
High	<ul style="list-style-type: none"> High ecological value (other ecosystem features dependent on it). International conservation value such as designated feature of a SAC, SPA, Ramsar sites, or SSSIs. Species “<i>of principal importance for the purpose of conserving biodiversity</i>” listed in Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006. National/international socio-economic value.
Medium	<ul style="list-style-type: none"> Moderate ecological value (e.g. abundant/common and/or another feature partially depends on it). National conservation value such as designated features of regional or county importance, such as county wildlife sites (CWSs), conservation areas. Moderate national/regional socio-economic value (e.g. commercial fishery).
Low	<ul style="list-style-type: none"> Low ecological value (e.g. not selected as an abundant/common taxa and/or limited connection to other ecosystem features). Regional/local conservation value such as local nature reserves. Local socio-economic value (e.g. artisanal fishery).
Very Low	<ul style="list-style-type: none"> Receptor neither common nor abundant locally and no functional dependencies. Receptors with no conservation designation. No immediate socio-economic value.

ii. Impact magnitude

1.3.30 Impact magnitude primarily considers the spatial extent of the impact, the duration of the impact and the amount of change (beneficial or adverse) relative to baseline conditions. Additional factors such as frequency, timing and reversibility are taken into consideration and reported where appropriate as these factors can contribute towards the sensitivity of a receptor to an impact (Ref. 1.11).

- 1.3.31 The predicted amount of change for a given impact is assessed in relation to regulatory thresholds or standardised pressure benchmarks, for example, environmental quality standards. In the absence of established standards, applied thresholds based on a ‘weight of evidence approach’ and pressure benchmarks proposed in Marine Evidence-based Sensitivity Assessments (Ref. 1.16) are used to inform impact magnitude. Pressure benchmarks provide a basis for assessing the sensitivity of a given receptor to the site-specific impacts relative to recognised standards. However, it should be noted that benchmarks are not universally applicable and site-specific factors at Sizewell may require further scrutiny.
- 1.3.32 Benchmark thresholds are applied to trigger further ecological investigation and do not necessarily infer sensitivity of all receptor groups.
- 1.3.33 The duration of the impact is considered in relation to pressure benchmarks and construction timelines. The construction phase is anticipated to last approximately nine to 12 years, impacts during the construction phase are considered short (< 1 year) to medium-term (1-12 years), whilst impacts that occur (or persist) for longer durations are considered long-term. Pressure benchmarks often consider changes over the course of a year, therefore impacts under one year are considered low duration. It should be noted, that sensitivity assessments (described in the following section) take into consideration the ecology of the species of concern relative to the duration/frequency of impacts.
- 1.3.34 Impact magnitude is assessed on a four-point scale; very low, low, medium, and high, as provided in **Table 1.3**.
- 1.3.35 Generic descriptions help with assigning impact magnitude. However, it should be noted that expert judgement is required when determining the weight of each of the factors involved in the overall assessment of impact magnitude. Within each receptor assessment, pertinent information required for assigning impact magnitude is provided.

Table 1.3: Marine ecology descriptions of impact magnitude

Impact Magnitude	Generic Description	Spatial Extent	Amount Of Change	Duration
High	Large-scale, measurable changes which are typically permanent or of long-duration over most of the study area and potentially beyond.	Changes occur across much of the area of interest and possibly beyond (e.g. 1,000s of hectares (ha)).	Clear, measurable changes beyond natural variation and exceeds site-specific pressure benchmark.	Long-term or even permanent, more than 12 years.
Medium	Medium-scale measurable changes over much of the study area. Impacts are typically not permanent or permanent impacts are small scale.	Changes occur across a moderate proportion of the area of interest (e.g. 100s of ha).	Measurable changes beyond natural variation.	Medium-term temporary impacts, one to 12 years.
Low	Noticeable but small-scale changes over a partial area. Impacts are typically short-term.	A partial spatial area is exposed to changes (e.g. 10s of ha).	Measurable changes within range of natural variation.	Short-term temporary, less than a year.
Very Low	Very small-scale or barely discernible changes, over a small area. Impacts are short-lived.	Very small extent is exposed to changes (e.g. 1ha).	Changes possible but intangible from natural variation.	Very short-term, e.g. spring-neap cycle or less.

iii. Sensitivity

1.3.36 Sensitivity assessments determine the resistance (or tolerance) of a receptor to a pressure and the ability to recover following the cessation of the pressure, termed resilience. Within the context of the **ES**, sensitivity assessments are completed relative to the site-specific magnitude of impacts predicted during construction and operational phases of the development.

1.3.37 Sensitivity is assessed on a four-point scale: Not Sensitive, Low, Medium, and High. A general guide for sensitivity assessment is provided in **Table 1.4**.

Table 1.4: Guidance for marine ecology sensitivity criteria

Sensitivity	General Description For Assigning Sensitivity
High	Little or no capacity for resistance, limited or prolonged recovery.
Medium	Low capacity for resistance, low capacity for resilience (e.g. after 10 years).
Low	Moderate resistance to the pressure, moderate capability for resilience (e.g. after 5 years).
Not Sensitive	High capacity for resistance, high capacity for resilience (e.g. after 1 year).

1.3.38 Resistance and resilience descriptors follow the general approach to the assessment of sensitivity described in **Volume 1, Chapter 6** of the **ES** but are further informed by the Marine Evidence-based Sensitivity Assessment approach for benthic (Ref. 1.16) and highly mobile (Ref. 1.17) receptors.

1.3.39 The resistance of an ecological receptor is assessed against the predicted impact magnitude. Resistance is considered using the following criteria:

- None: A severe decline in the extent, density or abundance of the habitat or species due to mortality or displacement.
- Low: A significant decline in the extent, density or abundance of the habitat or species due to mortality or displacement.
- Medium: A moderate decline in the extent, density or abundance of the habitat or species due to mortality or displacement.
- High: No or very minor changes in the extent, density or abundance of the habitat or species. Physiological and behavioural changes in metabolism, reproductive rates, feeding rates and foraging effort may occur but not at the detriment of the population.

1.3.40 The resilience of a receptor is assessed in terms of its ability to recover once the pressure is removed and the environment returns to pre-impact

conditions. A number of receptor specific factors are considered in the assessment of resilience, these include:

- the lifespan and age of maturity of the receptor;
- factors affecting fecundity, reproductive success, and/or larval mortality;
- dispersal and recruitment patterns; and
- population dynamics including natural mortality.

1.3.41 Recovery implies that a species or habitat has returned to pre-impacted habitat conditions or populations levels with structure and functioning maintained. It does not necessarily mean that all the species within the community have returned to pre-impacted levels.

1.3.42 Resilience following pressures causing behavioural avoidance/displacement are based on evidence for the time it takes a receptor to return to an impacted area once the pressure ceases. However, behavioural responses in highly mobile species (fish and marine mammals) can cause considerable population declines due to temporary displacement and should be given greater weight in assessing sensitivity (Ref. 1.17).

1.3.43 The **ES** considers the potential indirect food-web effects associated with such responses.

iv. Effects and significance

1.3.44 The aim of the EcIA process is to determine the occurrence of ecological effects and the potential significance of such effects caused by a proposed development. A final cross tabulation of the magnitude of impacts and sensitivity of the receptors, provided in **Table 1.5**, provides a guideline for the classification of effects. The tabulation is treated as a guideline and expert judgement must be applied once all the factors of the assessment have been considered and reported.

Table 1.5: Classification of effects based on sensitivity of receptors and magnitude of impact

Impact Magnitude	Sensitivity Of Receptor			
	Not Sensitive	Low	Medium	High
Very Low	Negligible	Negligible	Minor	Minor
Low	Negligible	Minor	Minor	Moderate
Medium	Minor	Minor	Moderate	Major
High	Minor	Moderate	Major	Major

- 1.3.45 The generic definitions of effects for marine ecology receptors are shown in **Table 1.6**.

Table 1.6: Generic definitions of effects to marine ecology receptors

Effect	General Description For Assigning Effects
Major	Very large or large changes in ecological receptors which may alter the structure or function of the overall marine ecosystem. Effects, both adverse and beneficial, that are likely to be important considerations at an international or national level because they contribute to achieving international/national objectives or are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate changes in ecological receptors that are likely to be important and could cause subtle changes in other ecosystem features.
Minor	Small change in ecological receptors with limited discernible effects on other ecosystem features. These effects may be raised as local issues but are unlikely to be instrumental in the decision-making process.
Negligible	No discernible change in the ecological features. An effect that is likely to have a negligible or no influence, irrespective of other effects.

- 1.3.46 Following the classification of an effect as presented in **Table 1.6**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. Identification of significant effects is central to the EIA process and reporting of such effects is required to allow decision makers to be adequately informed of the positive or negative ecological effects of the proposed development. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

- 1.3.47 Receptor value may influence the judgement of the significance of effect. For example, a minor effect to a designated species which contravenes conservation objectives may be considered significant. In accordance with CIEEM guidance a significant effect has implications for the biodiversity conservation objectives for important ecological features or for biodiversity in general. Additionally, an effect may be deemed significant if the structure or functioning of a defined site, habitat or ecosystem is adversely affected (Ref. 1.11).

f) Assessment criteria: fisheries

- 1.3.48 Effects on fisheries consider the sensitivity of the specific fishery to development impacts during the construction and operational phase of the proposed development. Assessments are based on the fishing gear groups defined (e.g. potting, driftnetting, trawling) and recreational fishing.

- 1.3.49 The commercial or recreational value of the fishery is determined from the commercial and recreational fisheries baseline characterisation, see **Appendix 22F** of **Volume 2** of the **ES**, and is based on the value definitions defined in **Table 1.3**.
- 1.3.50 The magnitude of predicted impacts considers an individual fishery basis and is defined spatially and temporally. Assessments consider whether an impact is temporary or permanent. Magnitude is largely a function of the fishery dependence on the area under consideration for the proposed development. **Table 1.7** provides the descriptors of impact magnitude for fisheries receptors.
- 1.3.51 The duration of impacts associated with construction are short-term to medium term, occurring over the nine to 12 years estimated for construction. Impacts associated with operation are potentially long-term, occurring over the operational lifetime of the proposed development. The timing of specific fisheries varies seasonally, and it is therefore not possible to standardise the definition of duration of effects across the receptor groups.
- 1.3.52 The sensitivity of each fishery receptor is scored based on limitations of operating in different fishing grounds and an ability of fishers to work more than one gear type. Descriptions of fisheries sensitivity are provided in **Table 1.8**.
- 1.3.53 The assessment of effects and significance follow the same approach as in **Table 1.6**.

Table 1.7: Definitions of impact magnitude for fisheries assessments

Impact Magnitude	Generic Description
High	A high proportion of the available fishing area and/or a high proportion of a commercial species (by weight or landing value) from the study area is impacted. Changes to fishing activity are long-term or permanent.
Medium	A moderate proportion of the available fishing area and/or a moderate proportion of a commercial species (by weight or landing value) from the study area is impacted. Changes to fishing activity is temporary but recovery within a reasonable timescale is not possible.
Low	A minor proportion of the available fishing area and/or a minor proportion of a commercial species (by weight or landing value) from the study area is impacted. The change is temporary and recovery is possible within a reasonable timescale.
Very Low	Little or no history of specific fishing activity in the areas under consideration; and/or the change is temporary and recovery is rapid.

Table 1.8: Descriptions of sensitivity for fisheries assessments

Sensitivity	Description
High	Restricted operational range and low ability to exploit other areas and low capability to utilise other gear types. High level of dependence on the fishing area allowing limited spatial tolerance. Limited ability to recovery losses from exploiting alternative fishing grounds.
Medium	Moderate operational range allowing access to other areas and/or moderate capability to utilise other gear types. Fishing in alternative areas may only partially recovers of losses.
Low	Large operational range allowing access to other areas and/or capability to utilise different gear types. Fishing in alternative areas allows high recoverability of losses.
Very Low	Extensive operational range and/or fishing method versatility. Able to target several fisheries.

g) Assessment methodology

- 1.3.54** The assessment of construction and operational phase impact on marine receptors is based on wide range of evidence sources specific to the proposed development. Sizewell C Project specific impact assessments include changes in coastal processes, changes in water and or sediment quality, introduction of noise, and cooling water abstraction resulting in impingement and entrainment pathways.
- 1.3.55** The specific details of the topic methodologies for determining impacts is detailed within the relevant technical appendices, as described below.
- 1.3.56** Water and sediment quality methodologies are summarised in **Volume 2, Chapter 21** of the **ES** and include:
- regulatory standards and thresholds for assessments (sediments standards, nutrient standards, dissolved oxygen standards, microbial standards, and chemical effects standards);
 - approaches to chemical discharge screening; and
 - discharge model selection² and parametrisation.

² Discharge modelling primarily applied Cornell Mixing Zone Expert System (CORMIX) and the General Estuarine Transport Model (GETM). The Cornell Mixing Zone Expert System is a US Environmental Protection Agency supported mixing zone model. The General Estuarine Transport Model is a validated 3D hydrodynamic model with an inbuilt passive tracer to represent relevant substances in the discharge. Further details are available in **Volume 2, Chapter 21** of the **ES**.

1.3.57 Marine Ecology and Fisheries assessments are contextualised against the baseline conditions at the main development site and wider southern North Sea area. These characterisation reports are presented in the following technical appendices of **Volume 2** of the **ES**:

- Phytoplankton characterisation. 2019. BEEMS Technical Report TR346 Ed.2. **Appendix 22A of Volume 2.**
- Zooplankton characterisation. 2019. BEEMS Technical Report TR315 Ed.2. **Appendix 22B of Volume 2.**
- Benthic ecology characterisation. 2018. BEEMS Technical Report TR348. **Appendix 22C of Volume 2.**
- Fish characterisation. 2016. BEEMS Technical Report TR345. **Appendix 22D of Volume 2.**
- Marine mammal characterisation. 2019. BEEMS Technical Report TR324 Ed.2. **Appendix 22E of Volume 2.**
- Commercial and recreational fisheries characterisation. 2019. BEEMS Technical Report TR123. Ed.3. **Appendix 22F of Volume 2.**

1.3.58 Impacts of the proposed development have been identified and assessed in detail in a series of specific technical reports that form appendices to the **ES**. Impact assessments are considered in relation to the baseline environmental conditions to determine the potential for effects from the proposed development and to ascertain if effects are significant. The primary technical reports that inform the **ES** assessments include:

- Sizewell Coastal Geomorphology and Hydrodynamics: Synthesis for Environmental Impact Assessment (MSR1/4). 2020. BEEMS Technical Report TR311 Ed.4. **Appendix 20A of Volume 2.**
- Sizewell Marine Sediment Quality. 2019. BEEMS Technical Report TR305. **Appendix 21D of Volume 2.**
- Sizewell C- Marine Water and Sediment Quality Synthesis (MSR2/6). 2019. BEEMS Technical Report TR306 Edition 6. **Appendix 21E of Volume 2.**
- Sizewell C - H1 Assessment. 2020. BEEMS Technical Report TR193 Edition 5. **Appendix 21F of Volume 2.**
- Sizewell Entrainment Predictions. 2020. BEEMS Technical Report TR318. **Appendix 22G of Volume 2.**

- Modelling the effect of Sizewell C entrainment on the phytoplankton of Sizewell Bay. 2020. BEEMS Technical Report TR385. **Appendix 22H of Volume 2.**
- Sizewell C - Impingement predictions based upon specific cooling water system design. 2020. BEEMS Technical Report TR406. **Appendix 22I of Volume 2.**
- Modelling of sediment dispersion of dredge material from Sizewell C construction and operation. 2019. BEEMS Technical Report TR480. **Appendix 22J of Volume 2.**
- Underwater noise effects assessment at Sizewell C. 2020. BEEMS Technical Report TR312 Edition 3. **Appendix 22L of Volume 2.**

h) Assumptions and limitations

1.3.59 Large scale infrastructure projects are inherently complex in their design and a degree of engineering flexibility is required as not all design details can be specified at the time of assessment. Accordingly, the ‘Rochdale Envelope’ principle is applied, whereby the worst-case design scenario is assessed. This approach ensures, as far as reasonably practicable, that the assessment encompasses the full range of design possibilities. Where there is uncertainty in the engineering design a description of the potential differences for different options is provided. Assessments envelope the worst-case impacts to ensure they are robust.

1.3.60 The assessments are based on baseline information and engineering designs at the time of DCO submission. The assumptions that underpin the assessments are detailed within the technical appendices and identified within **Volume 2, Chapter 22** of the **ES**.

1.3.61 The following general limitations have been identified:

- Assessments of effects on marine receptors is dependent on the baseline situation. Where high levels of natural variation in population size, distribution and/or extent occur, the potential to determine effects is reduced. The signal (effect) may be lost within natural variation. Predicted effect sizes in relation to natural variation are discussed within the assessment for each receptor.
- Sensitivity assessments are reliant on the availability of evidence regarding specific receptors physiology and ecology in similar environmental conditions/impact magnitudes. Where specific information is lacking, representative taxa or scenarios are considered. In cases of limited evidence, a precautionary assessment using expert

judgement is applied and the confidence in the assessment is reported accordingly.

- 1.3.62 Assumptions specific to the design and construction of the proposed development are further described in **Volume 2, Chapter 22** of the **ES**.

References

- 1.1 European Union. Council Regulation (EC) No. 1224/ 2009 of 20 November 2009 Establishing a Community Control System for Ensuring Compliance with the Rules of the Common Fisheries Policy, Amending Regulations (EC) No. 847/96, (EC) No 2371/2002, (EC) No. 811/2004, (EC) No. 2009, pp. 1–50 .
- 1.2 D. Hirst. Reforming the Common Fisheries Policy 2014-20, Briefing Paper, CBP-05957, House of Commons Library. 2015.
- 1.3 T. Catchpole et al. The Challenges of the Landing Obligation in EU Fisheries. Marine Policy, 2017, 82 , pp. 76–86 .
- 1.4 MMO. Fisheries Regulations: The Blue Book. <https://www.gov.uk/government/publications/fishing-regulations-the-blue-book>. 2017.
- 1.5 Environment Agency. Catchment Data Explorer. Available from: <https://environment.data.gov.uk/catchment-planning/>. (Online) Available from: <https://environment.data.gov.uk/catchment-planning/>. 2019.
- 1.6 DEFRA. Orford Inshore Marine Conservation Zone. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805511/Mcz-Orford-Inshore-2019.pdf. 2019.
- 1.7 UK Government. The Registration of Fish Buyers and Sellers and Designation of Fish Auction Sites Regulations 2005 Statutory Instrument 2005 No. 1605: <http://www.opsi.gov.uk/si/si2005/20051605.htm>. 2005.
- 1.8 DECC. Overarching National Policy Statement for Energy (EN-1) Department of Energy and Climate Change. 2011.
- 1.9 DECC. National Policy Statement for Nuclear Power Generation (EN-6) Volume I of II. National Policy Statements. 2011.
- 1.10 DEFRA. Eel Management Plans for the United Kingdom Anglian River Basin District. 2010.
- 1.11 CIEEM. Guidelines for Ecological Impact Assessment in Britain and Ireland: Terrestrial, Freshwater, Coastal and Marine. 2018 Available from: http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/EcIA_Guidelines/Final_EcIA_Marine_01_Dec_2010.pdf.
- 1.12 JNCC. Progress towards the Development of a Standardised UK Pressure-Activities Matrix. Healthy and Biologically Diverse Seas Evidence Group. 9th-10th October 2013. 2013.
- 1.13 CEFAS. Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements. Version 2. 2004.
- 1.14 SZC Co. Stage 3: Sizewell C Pre-Application Consultation. Volume 2A.

- Preliminary Environmental Information. 2019, pp. 376 .
- 1.15 The Oslo and Paris Convention. Pressure List and Descriptions. Paper to ICG-COBAM (1) 11/8/1 Add.1-E (amended version 25th March 2011) presented by ICG-Cumulative Effects. OSPAR Commission, London. 2011.
- 1.16 H. Tyler-Walters et al. Marine Evidence-Based Sensitivity Assessment – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth. 2018.
- 1.17 R. Pérez-Domínguez et al. Designing and Applying a Method to Assess the Sensitivities of Highly Mobile Marine Species to Anthropogenic Pressures. Natural England Commissioned Reports, Number 213. 2016.



VOLUME 1, CHAPTER 6, APPENDIX 6S: MARINE HISTORIC
ENVIRONMENT LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1. Marine Historic Environment

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant marine historic environment effects of the Sizewell C Project.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Chapter 23** of **Volume 2** of the **Environmental Statement (ES)**.

1.1.3 For the purposes of this methodology and **Chapter 23** of **Volume 2** of the **ES**, the 'site' is defined as the main development site located below the Mean High Water Mark (MHW). The historic environment methodology and assessment landward of MHW is presented in **Appendix 6L** of this volume and **Chapter 16** of **Volume 2** of the **ES** respectively. Proposed works above the MHW are, therefore, not referred to in this chapter.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant marine historic environment effects of the Sizewell C Project.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the marine historic environment assessment, as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. United Nations Educational, Scientific and Cultural Organization Convention on the Protection of the Underwater Cultural Heritage

1.2.3 The United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage 2001 (Ref. 1.1) is intended to enable states to better protect their submerged cultural heritage. The Convention:

- sets out basic principles for the protection of underwater cultural heritage;
- provides a detailed cooperation system for the member states; and

- provides widely recognized practical rules for the treatment and research of underwater cultural heritage.

1.2.4 The Convention consists of a main text and an annex, which set out the "*Rules for activities directed at underwater cultural heritage*". The main principles of the Convention are:

- Obligation to preserve underwater cultural heritage - member states should preserve underwater cultural heritage and take action accordingly. This does not mean that ratifying states would necessarily have to undertake archaeological excavations; they only have to take measures according to their capabilities. The Convention encourages scientific research and public access.
- *In situ* preservation as first option - the *in situ* preservation of underwater cultural heritage (i.e. in its original location on the seafloor) should be considered as the first option before allowing or engaging in any further activities. The recovery of objects may, however, be authorized for the purpose of making a significant contribution to the protection or knowledge of underwater cultural heritage.
- No commercial exploitation - the Convention stipulates that underwater cultural heritage should not be commercially exploited for trade or speculation, and that it should not be irretrievably dispersed. This requirement is in conformity with the moral principles that already apply to cultural heritage on land. It is not to be understood as preventing archaeological research or tourist access.
- Training and information sharing - member states shall cooperate and exchange information, promote training in underwater archaeology and promote public awareness regarding the value and importance of underwater cultural heritage.

1.2.5 The 2001 Convention neither regulates the ownership of wrecks nor does it change existing maritime zones.

1.2.6 In the Cultural White Paper (2016) (Ref. 1.2), the UK Government undertook to review its position on the ratification of the Convention. This review has been deferred (Ref. 1.3) due to other new and more immediate priorities. However, there remains a commitment to review the Government's position on the ratification of the Convention when priorities and resources permit (Ref. 1.3). The Government has already adopted the principles set out in the annex to the Convention as best practice in the

management of underwater cultural heritage (e.g. through the Marine and Coastal Access Act 2009 (Ref. 1.4)).

b) National

i. Legislation

- 1.2.7 The following legislation is relevant to the assessment of the effects on marine historic environment receptors.

The Ancient Monuments and Archaeological Areas Act 1979

- 1.2.8 The Ancient Monuments and Archaeological Areas Act 1979 (Ref. 1.5) sets out that sites assessed to be of national importance may be included within the schedule of monuments. These sites are afforded statutory protection and scheduled monument consent is required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a scheduled monument. This Act also provides for the designation of Areas of Archaeological Interest in which statutory provisions for access to construction sites for the purpose of carrying out archaeological works apply.

The Planning (Listed Building and Conservation Areas) Act 1990

- 1.2.9 The Planning (Listed Building and Conservation Areas) Act 1990 (Ref. 1.6) relates to the granting of planning permission for building works, with a particular focus on listed buildings and conservation areas. It created special controls for the demolition, alteration or extension of buildings, objects or structures of particular architectural or historic interest, as well as conservation areas. Buildings may be listed for a number of reasons:

- Architectural interest (such as design, decoration or craftsmanship).
- Historic interest (for example, if the building is representative of a particular type).
- Historic association (association with nationally important people or events).
- Group value (part of a larger ensemble).

- 1.2.10 Conservation areas are areas that have been designated as being of special architectural or historic interest, the character or appearance of

which it is desirable to preserve or enhance. Conservation area controls, as established by the Act, apply in addition to normal planning controls.

[The Infrastructure Planning \(Decisions\) Regulations 2010](#)

1.2.11 The Infrastructure Planning (Decisions) Regulations 2010 (Ref. 1.7) note duties on the decision-maker in the Development Consent Order (DCO) process to have regard to the desirability of:

- preserving listed buildings, their setting or any features of special architectural or historic interest which they possess;
- preserving or enhancing the character or appearance of conservation areas; and
- preserving scheduled monuments and their settings.

[The Protection of Military Remains Act 1986](#)

1.2.12 The Protection of Military Remains Act 1986 (Ref. 1.8) sets out specific protections for aircraft which have crashed or vessels which have sunk or been stranded while in military service. It sets out a general prohibition on any disturbance or removal of such remains without a licence granted by the Secretary of State (SoS).

[The Protection of Wrecks Act 1973](#)

1.2.13 The Protection of Wrecks Act 1973 (section 1) (Ref. 1.9) is designed to protect the site of a vessel lying wrecked on or in the sea bed on account of the historical, archaeological or artistic importance of the vessel, or of any objects contained or formerly contained in it which may be lying on the sea bed in or near the wreck. It secures protection of wreck sites in territorial waters (below high water mark) from interference by unauthorised persons.

[ii. National Policy Statements](#)

1.2.14 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.10) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.11). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

- 1.2.15 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.16 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account, is provided in **Table 1.1**. NPS EN-6 does not set out specific policy that informs the technical assessment of effects. The historic environment is not noted as a Nuclear Impact at Section 3 of Volume 1 of NPS EN-6, and while the Site Assessment of Sizewell (Volume II, Annex C) notes the potential effects of the scheme on heritage assets, specific policies on the historic environment are set out in NPS EN-1.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
EN-1 Paragraph 5.8.8-10	Paragraphs 5.8.8 and 5.8.9 requires that "...the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance...", referencing the requirements to have consulted the Historic Environment Record, and where appropriate to carry out desk-based assessment and further field evaluation. Paragraph 5.8.10 states that "The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents."	The significance of marine heritage assets potentially affected by the Sizewell C Project has been assessed according to relevant Historic England guidance and is set out within Chapter 23 of Volume 2 of this ES . Sources of information for the assessments presented in this ES , including a search of the Suffolk Historic Environment Record and Historic England National Record of the Historic Environment, are set out in section 1.3.27 of this appendix. An archaeological desk-based assessment has been carried out for the main development site and is included within the appendix for Chapter 23 of Volume 2 of the ES . Further evaluation, in the form of geophysical survey and geotechnical site investigations, has also been undertaken at a number of locations. Details of and results of surveys undertaken are discussed within Chapter 23 of Volume 2 of the ES
EN-1 Paragraph 5.8.9	Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain	Visualisations have been provided, and cross reference has been made to landscape and visual assessment chapters where appropriate. Further details are provided in Chapter 23 of

Ref.	NPS Topic Requirement	How The Requirement Has Been Addressed
	the impact.	Volume 2 of the ES .
EN-1 Paragraph 5.8.10	The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.	An assessment of likely significant effects on marine heritage assets is provided in Chapter 23 of Volume 2 of the ES .
EN-1 Paragraphs 5.8.14-15	Paragraphs 5.8.14-15 outline a presumption in favour of the conservation of designated heritage assets, and notes “Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the IPC should refuse consent unless... loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.”	An assessment of likely significant effects on marine heritage assets is provided in Chapter 23 of Volume 2 of the ES .
EN-1 Paragraph 5.8.20	Paragraph 5.8.20 states that the developer should be required to record and advance understanding of the significance of the heritage asset before it is lost.	Archaeological assessment of marine geophysical and geotechnical samples has been undertaken to identify assess and record the submerged palaeolandscape record. A finds reporting protocol will be in place during the proposed dredging activities to identify and record any chance archaeological discoveries.

iii. UK Marine Policy Statement 2011

- 1.2.17** The Marine Policy Statement, published in March 2011, was prepared and adopted under the Marine and Coastal Access Act 2009 (Ref. 1.4). The Marine Policy Statement provides the context for marine plans, which will provide detailed policy and spatial guidance and ensure that individual decisions within a plan area make the appropriate contribution to UK, national and area specific policy objectives, see **section 1.2.22** of this appendix.

iv. National Planning Policy Framework 2019

- 1.2.18 The National Planning Policy Framework (NPPF) (Ref. 1.12) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).
- 1.2.19 Section 16 relates to the Historic Environment and is consistent with the policies of EN-1. A positive strategy should be implemented for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. Heritage assets should be conserved in a manner appropriate to their significance. The marine historic environment baseline has been established and assessed in accordance with NPPF.
- 1.2.20 The National Planning Practice Guidance (Ref. 1.13), launched in 2014 and updated in 2019, brings together planning guidance on various topics into one place, including specific advice on enhancing and conserving the historic environment (Ref. 1.14).

v. Government's 25 Year Environment Plan

- 1.2.21 The UK Government's 25 Year Environment Plan (Ref. 1.15) sets out the value of the historic environment in general terms but does not set out specific policy.

c) Regional

i. East Inshore and Offshore marine plans

- 1.2.22 The East Inshore and Offshore Marine Plans (Ref. 1.16) state that the area contains a wealth of archaeological sites and heritage assets, with the potential to discover evidence of prehistoric activity in areas that were once on land. In other locations across the offshore area, discoveries of early human remains have been prevalent. Chapter 2, Objective 5 states the need to conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area.
- 1.2.23 In relation to the significance of any identified heritage assets (or the potential for such assets to be discovered), the plan states that consideration must be given to the available evidence, including information and advice from the relevant regulator and advisors and how they are managed. It should also take into account the historic character of the

marine plan areas, with particular attention paid to the landscapes, seascapes and groupings of assets that give it a distinctive identity.

1.2.24 Policy SOC2 states that proposals that may affect heritage assets should demonstrate, in order of preference:

- that they will not compromise or harm elements which contribute to the significance of the heritage asset;
- how, if there is compromise or harm to a heritage asset, this will be minimised;
- how, where compromise or harm to a heritage asset cannot be minimised it will be mitigated against; or
- the public benefits for proceeding with the proposal if it is not possible to minimise or mitigate compromise or harm to the heritage asset

d) Local

i. [Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies](#)

1.2.25 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

1.2.26 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan (Ref. 1.17).

1.2.27 The adopted Suffolk Coastal Local Plan comprises the: 'saved policies' of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013) (Ref. 1.18); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

1.2.28 Specifically, the following policy has relevance to the marine historic environment assessment for the Sizewell C Project:

- Development Management Policy DM21 – Design: Aesthetics; reiterates that proposals should incorporate and protect existing site

features of landscape, ecological, heritage or amenity value as well as enhance such features.

- 1.2.29 Whilst there is no specific policy that governs the development or the strategic proposals for the historic environment, the development Management Policy (Historic Environment, paragraph 3.150) sets out the following;

“...decisions on development proposals affecting heritage assets will be informed as appropriate by Conservation Area Appraisals, information from the Historic Environment Record and Archaeological Assessments.”

ii. [Suffolk Coastal District Council Final Draft Local Plan](#)

- 1.2.30 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

- 1.2.31 The Suffolk Coastal Final Draft Local Plan (Ref. 1.17) sets out the following draft policies of relevance to the marine historic environment assessment:

- Policy SCLP11.3: Historic Environment: consideration of the effects of proposed development on the historic environment;
- Policy SCLP11.4: Listed Buildings: sets out criteria for proposals to alter, change or extend the use of a listed building, and development affecting setting;
- Policy SCLP11.5: Conservation Areas: sets out criteria for development within a conservation area;
- Policy SCLP11.6: Non-Designated Heritage Assets: sets out criteria for consideration in proposals for re-use or loss of an asset; and
- Policy SCLP11.7: Archaeology: includes the need for proportionate assessment of the potential and significance of remains to be included with an application, appropriate conditions to be imposed on consents;

e) [Guidance](#)

- 1.2.32 This assessment has been undertaken in accordance with the following guidance documents:

- Good Practice Advice in Planning Note 2: Managing Significance in decision-taking in the Historic Environment (Ref. 1.19).
- Conservation Principles, Policies and Guidance (Ref. 1.20).
- Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (Ref. 1.21).
- Code of Practice for Seabed Developers (Ref. 1.22).
- Research and Archaeology: Framework for the East of England (2000, 2011 and draft updates 2018-19) (Ref. 1.23, Ref. 1.24, Ref. 1.25, Ref. 1.26).
- People and the Sea: A Maritime Archaeological Research Agenda for England (Ref. 1.27).
- National and Local Archaeological Standards and Guidance.
- i. [Good Practice Advice in Planning Note 2: Managing Significance in decision-taking in the Historic Environment.](#)

1.2.33 Good Practice Advice in Planning Note 2 (Ref. 1.19) provides guidance and information to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy and ensuring compliance with NPPF fundamentals.

1.2.34 It is important to understand the nature, extent and level of significance of an asset, and the contribution of its setting to its significance, in order to understand the impact of the proposals on that significance and for decisions to be made in line with legal requirements, objectives of the development plan and the policy requirements of applicable national policy.

1.2.35 The significance of an asset, as discussed in further detail in **section 1.3** of this appendix, is the sum of its archaeological, architectural, historic and artistic interests. Whilst not providing a methodology for producing impact assessments for the historic environment, the guidance draws on Conservation Principles (Ref. 1.20) to set out appropriate steps to follow in order to build a robust understanding of the significance of heritage assets (both designated and undesignated).

1.2.36 The guidance emphasises that information required in support of applications for planning permission should be proportionate to the

significance of the heritage assets affected and the impact on that significance.

ii. [Good Practice Advice in Planning Note 3: The Setting of Heritage Assets](#)

1.2.37 Good Practice Advice in Planning Note 3 (Ref. 1.21) sets out the parameters by which setting should be explored, documented and presented within assessments.

1.2.38 The document sets out five steps to follow to ensure an appropriate level of assessment is achieved. These steps are as follows:

- step 1: identify which heritage assets and their settings are affected;
- step 2: assess whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s);
- step 3: assess the effects of the proposed development, whether beneficial or harmful, on that significance;
- step 4: explore the way to maximise enhancement and avoid or minimise harm; and
- step 5: make and document the decision and monitor outcomes.

iii. [Code of Practice for Seabed Developers](#)

1.2.39 The Joint Nautical Archaeology Policy Committee Code (Ref. 1.22) sets out recommended procedures for consultation and co-operation between seabed developers and archaeologists. It seeks to ensure seabed developers acknowledge the potential scientific value of archaeological evidence on, or concealed within, the seabed and make every effort to report, promptly, unexpected discoveries encountered.

iv. [Research and Archaeology: Framework for the East of England](#)

1.2.40 East Anglian Archaeology produced a two-part research framework for the East of England (Research and Archaeology: A Framework for the Eastern Counties).

1.2.41 Part 1 (Ref. 1.23) comprised an initial Resource Assessment, which sought to better understand the current state of knowledge and understanding within the region.

- 1.2.42 Part 2 was produced in 2000, comprising a Research Agenda and Strategy (Ref. 1.24), which set out the potential of the evidence currently available within the region, together with gaps in knowledge and research topics. Also presented were a range of research issues which could usefully be addressed within the region. The strategy section of the document considered priorities for future research and outlined an integrated approach to research within the region, exploring collaborative arrangements and partnerships, with a prioritised list of objectives.
- 1.2.43 In 2011, the previous research documents were revised and augmented into the Research and Archaeology Revisited: A Revised Framework for the East of England (Ref. 1.25). This document considered the new evidence on a period-by-period basis, subdivided within each period into an assessment of key projects undertaken since 2000, an assessment of progress on research topics proposed in 2000 and a consideration of future research topics. The Revised Framework is in the process of being comprehensively reviewed and updated (Ref. 1.26).
- 1.2.44 At the time of submitting the **ES** in early 2020, time period summaries were available and have been considered during the production of the **ES** and in formulating the mitigation strategies.
- v. [People and the Sea: A Maritime Archaeological Research Agenda for England](#)
- 1.2.45 People and the Sea: A Maritime Archaeological Research Agenda for England (Ref. 1.27) is a resource assessment, research agenda and research framework for England's maritime and marine historic environment. It provides a coherent overview of previous research into England's maritime, marine and coastal archaeology, enabling long-term strategic planning, informing policy and providing a statement of agreed future research priorities.
- vi. [Archaeological Standards and Guidance](#)
- 1.2.46 Relevant best practice standards and guidance are published by the Chartered Institute for Archaeologists and others as set out below. For the purposes of this assessment, the relevant standards and guidance comprise:
- Chartered Institute for Archaeologists Standard and guidance for archaeological desk-based assessment 2017 (Ref. 1.28).

- Chartered Institute for Archaeologists Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment 2014 (Ref. 1.29).
- Chartered Institute for Archaeologists Standard and guidance for archaeological geophysical survey 2014 (Ref. 1.30).
- EAC Guidelines for the use of Geophysics in Archaeology (Ref. 1.31).
- Historic England - Environmental Archaeology (Ref. 1.32).
- Historic England - Geoarchaeology (Ref. 1.33).
- Historic England - Marine Geophysics Data Acquisition, Processing and Interpretation (Ref. 1.34).

1.3 Methodology

a) Scope of the assessment

- 1.3.1 The generic EIA methodology is described in **Chapter 6** of this volume.
- 1.3.2 This section provides a summary of the marine historic environment assessment methodology. The scope of assessment considers the impacts of the construction and operation of the Sizewell C Project, as well as the removal and reinstatement phase (where applicable).
- 1.3.3 The marine historic environment formally comprises tangible remains of human activity within the zone below Mean High Water Mark (MHWM), with remains above MHWM being considered in **Chapter 16** of **Volume 2** of the **ES**. Where appropriate, features within the intertidal zone which form part of terrestrial heritage assets are considered within **Chapter 16** of **Volume 2** of the **ES**.
- 1.3.4 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.
- 1.3.5 Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

- 1.3.6 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. A summary of the general comments raised and SZC Co.'s responses are detailed in **Table 1.2**.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the marine historic environment assessment.

Consultee	Date	Summary Of Discussion/Comments
SCCAS, Historic England, ESC	Various	The detailed scope for the assessment of effects arising through change to setting was consulted upon over the course of the pre-application phase is set out in this appendix.
Historic England	Various	The scope and methods for geophysical survey and geotechnical site investigations were consulted on with Historic England in advance of offshore site investigations. Specific comments on the main development site are included within Chapter 23 of Volume 2 of the ES , where relevant.
Historic England	Meeting at Historic England East of England Regional Office: 21/06/19	Study area for the marine historic environment assessment was agreed with Historic England as the site boundary for offshore works.

c) Study area

- 1.3.7 The geographical extent of the study area for the main development site comprises the site boundary east of the MHW. This is site specific and consultation was undertaken with Historic England with regards the suitability of the spatial scope for the area considered for the marine historic environment assessment within the **ES**.

d) Assessment scenarios

- 1.3.8 The marine historic environment assessment comprises the assessment of the entire construction and operational phases, and removal and reinstatement phase where relevant, for the proposed main development site as described in **Chapter 23** of **Volume 2** of the **ES**.

e) Assessment criteria

- 1.3.9 As described in **Chapter 6** of this volume, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. Assessments broadly consider the magnitude of

impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.

1.3.10 A summary of the assessment criteria used in the marine historic environment assessment is presented in the following sub-sections.

i. Sensitivity (heritage significance)

1.3.11 NPS EN-1 (Ref. 1.10) requires change to the significance of heritage assets to be considered in developing an understanding of the potential effects of a proposed development.

1.3.12 The significance of a heritage asset is a product of the value which it holds to this and future generations as a result of its historic, archaeological, architectural or artistic interests, and these provide the basis for considering the significance of each heritage asset (including the contribution of its setting to those interests). These interests are set out in NPS EN-1 (para. 5.8.2) and are discussed in more detail in Conservation Principles (Ref. 1.20) and Good Practice Advice 2 (Ref. 1.19). These comprise:

- archaeological – the ability of a heritage asset to hold information about the past which can be retrieved through specialist investigation;
- historical – which can be through association with past events or people, or where a heritage asset is illustrative of a particular asset type, theme or period; and
- architectural/artistic – values which derive from a contemporary appreciation of a heritage asset's aesthetics.

1.3.13 NPS EN-1 (Ref. 1.10) notes that setting contributes to an asset's significance and sets out policies regarding change to the setting of heritage assets, but does not offer an explicit definition. Setting is defined in both the NPPF (Ref. 1.12) and by Historic England in Good Practice Advice 3 (Ref. 1.21) as:

“...the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.”

1.3.14 Good Practice Advice 3 (Ref. 1.21) advises that the following aspects of setting should be considered in addition to any identified key attributes:

- the physical surroundings of the asset, including its relationship with other assets;
- the way the asset is appreciated; and
- the asset's associations and patterns of use.

1.3.15 For the purposes of assessing the significance of effects within this **ES**, heritage significance has been assigned to one of four classes, with reference to the heritage interests described above and relying on professional judgement as informed by policy and guidance. The hierarchy given in **Table 1.3** reflects the EN-1 (Ref. 1.10) distinction between designated and non-designated heritage assets, and also distinguishes between designated assets of the highest heritage significance (i.e. scheduled monuments, protected wreck sites, and World Heritage Sites) and other designated heritage assets.

1.3.16 The assignment of assets into one of the four classes of heritage significance is supported by a clear narrative, and professional judgement. There may be assets which are currently non-designated but may, as set out in the NPPF (Ref. 1.12), be considered of 'schedulable quality', i.e. to hold equivalent significance to scheduled monuments. Locally significant sites may be considered as higher than 'low' significance when covering significant areas.

1.3.17 The criteria used in the marine historic environment assessment for determining the sensitivity of receptors are set out in **Table 1.3**.

Table 1.3: Assessment of the heritage significance of receptors for marine historic environment.

Heritage Significance	Description	Example Asset Class
High	Asset has significance for an outstanding level of archaeological, architectural, historic and/or artistic interest.	All designated heritage assets or non-designated assets of demonstrably schedulable quality.
Medium	Asset has significance for a high level of archaeological, architectural, historic and/or artistic interest.	Locally listed structures and those of merit.
Low	Asset has significance for elements of archaeological architectural, historic or artistic interest.	Locally-significant archaeological site.
Very Low	Due to its nature of form/	Non-extant Historic Environment

Heritage Significance	Description	Example Asset Class
	condition/survival, cannot be considered as an asset in its own right.	Record record.

ii. Magnitude

1.3.18 The magnitude of impact is based on the consequences that the proposed development would have on the significance of the historic environment resource and has been considered using the terms of high-medium-low-very low. The magnitude of an impact is based on a number of factors:

- the duration of the impact (temporary, permanent or reversible);
- physical changes caused by the impact (both positive and negative);
- the extent of the heritage asset that would be affected (e.g. the whole or a very small part);
- the nature of the heritage asset that would be affected; and
- the overall impact of changes on the values and significance of the heritage asset (including its setting).

1.3.19 In this context, the magnitude of impact arising through change in the setting of a heritage asset may depend on individual aspects of that setting, and assessments must be, by their nature, specific to the individual assets being considered.

1.3.20 Impacts on receptors are assigned to one of four classes of magnitude. The criteria for the assessment of magnitude are shown in **Table 1.4**. Impacts can be adverse or beneficial and it is recognised that EN-1 (para. 5.8.13) (Ref. 1.10) looks to developers to make, where possible, a positive contribution to the historic environment as part of its design response.

1.3.21 NPS EN-1 (Ref. 1.10) further distinguishes between ‘harm’ and ‘substantial harm’, and sets out how development that gives rise to harm should be considered within the planning process. For the purposes of this assessment, any adverse change to a designated heritage asset would normally be considered to comprise harm, while a high magnitude of change would approach or constitute substantial harm. Comments on the magnitude of any harm accruing to designated heritage assets or non-designated heritage assets of equivalent heritage significance are made in the narrative of the assessment.

Table 1.4: Assessment of magnitude of impact on the marine historic environment.

Magnitude	Summary Rationale (Negative)	Summary Rationale (Positive)
High	Loss of significance of an order of magnitude that would result from irreversible total or substantial demolition/disturbance of a heritage asset or from the disassociation of an asset from its setting. This would generally be considered substantial harm.	Sympathetic restoration of an at-risk or otherwise degraded heritage asset and/or its setting and bringing into sustainable use with robust long-term management secured.
Medium	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its importance. Change to the key characteristics of an asset's setting, which gives rise to lasting harm to the significance of the asset but which still allows its archaeological, architectural or historic interest to be appreciated. Impacts of this magnitude would generally be considered less than substantial harm on the heritage significance of an asset.	Appropriate stabilisation and/or enhancement of a heritage asset and/or its setting that better reveal the significance of the asset or contribute to a long-term sustainable use or management regime.
Low	Minor loss to or alteration of an asset which leave its current significance largely intact. Minor and/or short-term changes to setting which do not affect the key characteristics and in which the historical context remains substantially intact. Impacts of this magnitude would generally be considered less than substantial harm on the heritage significance of an asset.	Minor enhancements to a heritage asset and/or its setting that better reveal its significance or contribute to sustainable use and management.
Very Low	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and/or short-term or reversible change to setting which does not affect the significance of the asset. Impacts of this magnitude would generally be considered of limited harm to heritage significance.	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and/or short-term or reversible change to setting which does not affect the significance of the asset.

iii. Effect definitions

- 1.3.22 The classification of the effect is judged on the relationship of the magnitude of impact to the assessed heritage significance of the resource as shown in **Table 1.5**.
- 1.3.23 The assessment of the effect is reported following incorporation of environmental measures into the design, such as ‘embedded mitigation’.
- 1.3.24 The definitions of effect for the marine historic environment are shown in **Table 1.5**.

Table 1.5: Classification of effects.

		Heritage Significance			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

- 1.3.25 Following the classification of an effect, as presented in **Table 1.5**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.
- 1.3.26 The assessment is presented as a clear narrative discussion, setting out the significance of the relevant heritage asset(s), and, where appropriate, contribution of their settings to significance in line with the categories defined in **Table 1.3**, providing a description of the anticipated change and setting out the magnitude of impact in line with the definitions set out in **Table 1.4**, and classification of effects as set out in **Table 1.5**.

f) Assessment methodology

i. Establishing the baseline

Existing baseline

- 1.3.27 Heritage assets were identified through the following sources:

- a search of the records held within the Historic England National Record of the Historic Environment and the Suffolk County Council Historic Environment Record;
- a search of the National Heritage List for England, which contains designated data for the whole of the UK;
- a search of the records held within the United Kingdom Hydrographic Office (UKHO) Wreck List;
- analysis of the Historic Landscape Characterisation data for Suffolk;
- a review of the available light detecting and ranging data from Environment Agency Geomatics and Channel Coastal Observatory;
- a search of historical maps and documentation at the Ipswich branch of the Suffolk Record Office;
- aerial photography from the Channel Coastal Observatory; and
- marine geophysical data held by UKHO and The Crown Estate Marine Data Exchange.

1.3.28 A programme of non-intrusive (e.g. geophysical surveys and site visits) and intrusive site investigations (geotechnical site investigations) were carried out at locations across the proposed main development site east of MHWM in order to identify both known and previously unrecorded heritage assets (e.g. historic shipwrecks). Where undertaken, geotechnical site investigations were designed in consultation with Historic England and carried out in accordance with an agreed Written Scheme of Investigation for archaeological investigation under a Marine License.

1.3.29 On the basis of the results of the non-intrusive and intrusive investigations, a programme of ongoing evaluation and mitigation strategy has been designed in consultation with Historic England. Details are included within **Chapter 23 of Volume 2 of the ES**.

Future baseline

1.3.30 For the establishment of future baseline, committed developments and natural changes to the baseline conditions were considered. No committed development(s) or forecasted changes that would materially alter the baseline conditions during the construction and operation of the proposed

development were identified. It is possible, however, that indirect pressures (such as changes to hydrodynamics, sediment suspension or substrate disturbance) could affect different geomorphic receptors (e.g. the beach; see **Chapter 20** of **Volume 2** of the **ES**), leading to disturbance/exposure of any archaeological remains which may be present.

ii. Assessment Phases

1.3.31 The assessment of effects on marine historic environment during construction, operation and removal and reinstatement phases uses the same significance assessment methodology. The assessment follow the same basic process:

- identify receptors which may be subject to a likely potential significant adverse effect;
- assess the significance of any heritage assets likely to be affected;
- identify the nature of the potential impact, whether direct or indirect and its magnitude; and
- identify the need for and form of any additional mitigation.

1.3.32 Direct effects on heritage assets are those which result from physical damage or disturbance which gives rise to a loss of heritage significance. Consequently, it is only those assets which might be physically disturbed by (i.e. within the footprint of) the proposed main development site, which are potentially subject to direct effects.

1.3.33 Indirect effects have been defined as those which result in change to heritage significance but do not give rise to physical damage or disturbance to the asset. In this context, these effects would generally arise through change to the settings of heritage assets. Assessment of settings is primarily associated with designated heritage assets or non-designated heritage assets of equivalent significance (where such assets are identified). Any intertidal sites straddling the MHWM, if requiring setting assessments, are discussed in **Chapter 16** of **Volume 2** of the **ES** for the main development site.

iii. Inter-relationships

1.3.34 Archaeological remains within the marine historic environment are subject to changes both from direct disturbance as a result of construction activity and natural processes within the marine environment (e.g. sediment

mobility). Therefore these inter-relationship effects have been considered within the assessment presented in **Chapter 23** of **Volume 2** of the **ES**.

g) **Assumptions and limitations**

1.3.35 The following overall limitations have been identified:

- desk-based assessment is a predictive tool and relies on a series of assumptions and extrapolations to develop an understanding of the potential extent and character of archaeological remains within the site;
- a programme of geophysical survey and geotechnical site investigations have been undertaken at locations across the proposed marine development area and is detailed within **Chapter 23** of **Volume 2** of the **ES**;
- geophysical survey is based on taking physical measurements that may have a number of causes, and conclusions from this type of survey remain predictive, but allows more refined inferences to be drawn on the basis of the nature and morphology of discrete anomalies;
- geotechnical site investigations allow inferences made on the basis of desk-based and geophysical survey to be tested. While this approach considers a sample area of a site, it allows a clear understanding of the location, nature and significance of heritage assets which can be considered robust;
- where assessment conclusions are based on desk-based or geophysical survey, the implications for the robustness of conclusions based on a reasonable worst-case is provided; and
- the extent of dredging associated with marine infrastructure construction and operation will depend on the detailed design and construction methods which are yet to be confirmed, so conservative areas have been assessed in the **ES**, shown in **Volume 2, Chapter 23, Figure 23.1**, and will need to be licensed by the Marine Management Organisation.

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VOLUME 1, CHAPTER 6, APPENDIX 6T: MARINE NAVIGATION LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1 Marine Navigation Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant effects of the Sizewell C Project on marine navigation.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Volume 2, Chapter 24** of the Environmental Statement (**ES**) and the Navigational Risk Assessment (NRA) (**Appendix 24A** of **Volume 2** of the **ES**).

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant effects on marine navigation of the proposed development.

1.2.2 Legislation and policy has been considered on an international, national, regional and local level. The following is considered to be relevant to the marine navigation assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. Legislation

1.2.3 The following international legislation has been taken into consideration in this assessment:

- United Nations Convention on the Law of the Sea (1982) – which defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment and the management of marine natural resources.
- International Maritime Organisation (IMO) International Regulations for Preventing Collisions at Sea, as implemented in the United Kingdom through Merchant Shipping Notices – which sets the navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels.

- Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea, as amended, as implemented under United Kingdom (UK) legislation by The Merchant Shipping (Safety of Navigation) Regulations 2002, which specifies minimum standards for the construction, equipment and operation of ships, compatible with their safety.

b) National

i. Legislation

Merchant Shipping Notices (IMO, 1972/78)

- 1.2.4 Merchant shipping notices are used to convey mandatory information that must be complied with under UK legislation regarding important safety, pollution prevention and other relevant information.

The Merchant Shipping (Safety of Navigation) Regulations 2002

- 1.2.5 These regulations give effect to the provisions of Chapter V of Safety of Life at Sea as amended.

ii. Policy

National Policy Statements

- 1.2.6 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref 1.1) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref 1.2). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.7 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.8 A summary of the relevant NPS EN-1 requirements, together with consideration of how these requirements have been taken into account, is

provided in **Table 1.1**. There are no requirements in EN-6 that are relevant to marine navigation.

Table 1.1: Requirements of the National Policy Statements.

Ref.	NPS topic requirement	How the requirement has been addressed
EN-1 para. 5.4.8	<i>“The MoD operates military training areas, military danger zones (offshore Danger and Exercise areas), military explosives storage areas and Tactical Training Areas. There are extensive Danger and Exercise Areas across the UK Continental Shelf Area (UKCS) for military firing and highly surveyed routes to support Government shipping that are essential for national defence. It is important that new energy infrastructure does not significantly impede or compromise the safe and effective use of any defence assets.”</i>	Military practice areas have been considered within the baseline assessment reported in Volume 2, Chapter 24 of the ES .

Marine Policy Statement

1.2.9 The UK Marine Policy Statement (Ref. 1.3) is a framework for preparing marine plans and taking decisions affecting the marine environment. The UK Marine Policy Statement states that any decisions made should minimise any adverse effects on shipping activity, freedom of navigation and navigational safety. The marine aspects of the Sizewell C Project have been designed to minimise impacts on marine navigation with impacts fully assessed in **Volume 2, Chapter 24** of the **ES**.

c) Regional

1.2.10 The East Inshore and Offshore marine plans (Ref. 1.4) inform and guide regulation, management, use and protection of the area of sea stretching from Flamborough Head to Felixstowe. The marine plans provide information on the Sizewell C Project, which has been considered in line with the National Policy Statements.

d) Local

1.2.11 No local policy is deemed relevant to the assessment of shipping and navigation.

e) Guidance

1.2.12 This assessment has been undertaken in accordance with the following guidance documents:

- IMO Guidelines for Formal Safety Assessment – MSC/Circ. 1023 (Ref. 1.5).
- MGN (Marine Guidance Note) 543 (MCA, 2016) Offshore Renewable Energy Installations – Guidance on Navigational Practice, Safety and Emergency Response Issues (Ref. 1.6).

1.2.13 Although the Marine Guidance Note 543 is focused on offshore renewable developments, it highlights issues to be taken into consideration when assessing the effects of offshore developments on navigational safety.

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES**.

1.3.2 This section provides specific details of the marine navigation methodology applied to the assessment of the main development site. The scope of assessment considers the impacts during the construction and operational phases of the proposed development.

1.3.3 A high level description for the anticipated activities for the decommissioning of the Sizewell C power station, including a summary of the types of effects likely to occur is provided in **Chapter 5** of **Volume 2** of the **ES**. Decommissioning will be subject to a separate assessment as part of a stand-alone marine licence application nearer the time, and therefore has not been assessed in detail.

1.3.4 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of this volume.

1.3.5 Comments raised in the EIA scoping opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.

b) Consultation

1.3.6 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees and key stakeholders throughout the design and assessment process. The following were consulted:

- Trinity House.
- Maritime & Coastguard Agency.
- Royal Yachting Association.
- Cruising Association.
- East Anglia Wind Farm Operator.
- Eastern Inshore Fisheries and Conservation Authority.
- Royal National Lifeboat Institution.
- Local fisherman.
- Orford & District Fishing Association.
- CEMEX UK Marine Ltd.
- Hanson Aggregates Marine Ltd.

1.3.7 A summary of the comments raised and SZC Co's responses are detailed in **Appendix 24A** of **Volume 2** of the **ES**.

1.3.8 **Table 1.2** provides a summary of feedback from the consultation process that is relevant to the assessment methodology.

Table 1.2: Summary of consultation responses that have informed the scope and methodology of the marine navigation assessment.

Consultee	Date	Summary of discussion/ comments
PINS	2019 Scoping Responses	The ES should identify the anticipated type and number of vessel movements generated by the development during the construction and operation phases and assess the potential impact to other existing vessel movements in the area.

Consultee	Date	Summary of discussion/ comments
PINS	2019 Scoping Responses	Disturbance to fishing and recreational activities must be assessed where a likely significant effect would occur.
Maritime & Coastguard Agency	2019 Scoping Responses	The overall approach to the required and updated traffic study and Navigation Risk Assessment as described in Section 6.17 is accepted.
Marine Management Organisation (MMO)	2014 Scoping Response	A NRA is required as part of the EIA. This should consider recreation and commercial navigation.
MMO	2014 Scoping Response	It would be beneficial to characterise vessel traffic to and from ports and harbours within the study area. Additionally, effects and interaction with marine traffic using the Southwold Ship-to-Ship transfer area should also be considered.
Royal Yachting Association (RYA)	3 rd April 2019 (Hazard Workshop)	Collision risk associated with dredgers should be included in impact assessment.
Cruising Association	5 th March 2015 (Hazard Workshop)	Importance of carrying out localised analysis of vessel movements in the immediate vicinity of Sizewell C was emphasised.
Hanson Aggregates Marine Ltd.	5 th March 2015 (Hazard Workshop)	It was agreed that movements of survey vessels, tenders and tug boats would be fully considered in the NRA.

c) Study area

1.3.9 The study area is an (approximately) 12 nautical mile (nm) buffer around the main platform (as detailed in **Volume 2, Chapter 24** of the **ES**). This is considered sufficient to provide an overview of marine navigation activity in proximity to the offshore works of the Sizewell C Project.

d) Assessment scenarios

1.3.10 Assessment is undertaken for the construction and operational phases of the marine aspects of the proposed development. This includes the following impacts associated with the construction phase:

- Construction of the Beach Landing Facility (BLF).
- Dredging works to create a navigational channel and grounding area for movement of vessels to and from the BLF.
- Boring of two cooling water intake tunnels, one cooling water outfall tunnel, a Combined Drainage Outfall (CDO) and two Fish Recovery and Return (FRR) system outfalls.

- Placement and piling of the intake/outfall headworks, including drilling the vertical shafts.
- Dredging works to support provision of the headworks.
- Abnormal Indivisible Load (AIL) deliveries during the construction phases.

1.3.11 During the operational phase, impacts associated with the following are assessed:

- Operation of the intake/outfall headworks and FRR systems.
- Dredging works association with the BLF.
- AIL deliveries.

1.3.12 The FRR systems and CDO structures will rest within the sand surface and therefore are not expected to present any risk to marine navigation.

1.3.13 The assessment considers the construction and operational phases in their entirety on the basis of worst case assumptions.

e) [Assessment criteria](#)

1.3.14 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have a significant effect on any resources or receptors. For the marine navigation assessment, the risk to navigation posed by the proposed development is considered. The IMO Formal Safety Assessment process approved by the IMO in 2002 under SC/Circ.1023/MEPC/Circ392 (Ref. 1.5) has been applied. This is a structured and systematic methodology based on risk analysis and cost benefit analysis (if applicable).

1.3.15 The Formal Safety Assessment assigns each risk a “severity of consequence” and a “frequency of occurrence” to evaluate the significance of each risk.

1.3.16 A summary of the assessment criteria used in the marine navigation assessment is presented in the following sub-sections.

i. Severity of Consequence

1.3.17 The severity of consequences is assessed on a five-point scale. The defined consequence bands are presented in **Table 1.3**.

Table 1.3: Assessment of the severity of consequence for marine navigation.

Severity	People	Property	Environment	Business
Negligible	Zero injury	Minimal damage (<£10k)	Zero effect	Zero impact (<£10k)
Minor	Minor injury	Minor damage (£10k-£100k)	Minor effect (Local assistance required)	Minor impact (£10k-£100k)
Moderate	Major injury	Moderate damage (£100k-£1M)	Moderate effect (Limited external assistance required)	Considerable impact (£100k-£1M) Local publicity
Serious	Single fatality	Major damage (£1M-£10M)	Major effect (Regional assistance required)	Major national impact (£1M-£10M) National publicity
Major	Multiple fatalities	Extensive damage (>£10M)	Extensive effect (National assistance required)	Major international impact (>£10M) International publicity

ii. Frequency of Occurrence

1.3.18 The frequency of occurrence is also assessed on a five-point scale, as presented in **Table 1.4**.

Table 1.4: Assessment of frequency of occurrence for marine navigation.

Frequency	Criteria
Negligible	< 1 occurrence per 10,000 years
Extremely Unlikely	1 per 100 to 10,000 years
Remote	1 per 10 to 100 years
Reasonably Probable	1 per 1 to 10 years
Frequent	Yearly

iii. Risk Matrix

1.3.19 The severity of consequence and frequency of occurrence rankings are then used to determine the level of risk for each impact. Levels of risk are

described as “Unacceptable”, “Tolerable” or “Broadly Acceptable” using the risk matrix shown in **Table 1.5**.

Table 1.5: Risk Matrix.

		Frequency of occurrence				
		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
Severity of Consequence	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Moderate	Broadly Acceptable	Tolerable	Tolerable	Tolerable	Unacceptable
	Serious	Tolerable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

1.3.20 The language used by the Formal Safety Assessment method (“Unacceptable”, “Tolerable” or “Broadly Acceptable”) differs from that used in the standard EIA methodology (“Negligible”, “Minor”, “Moderate” and “Major”) because the assessment is made against risk as opposed to impact. Definitions for risk categories are provided in **Table 1.6**.

Table 1.6: Risk Definitions.

Risk	Definition
Unacceptable	Generally regarded as unacceptable regardless of the level of benefit associated with the activity. Under EIA terms unacceptable is considered to be significant and would require risk mitigation or design modification to reduce to tolerable (As Low As is Reasonably Practicable (ALARP)).
Tolerable	Under EIA terms tolerable is considered to be not significant, however there is an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are ALARP and that risks are periodically reviewed to monitor if further controls are appropriate.
Broadly Acceptable	Under EIA terms broadly acceptable is considered to be not significant and impacts are regarded as acceptable and adequately controlled.

f) Assessment methodology

i. Establishing the baseline

Existing baseline

1.3.21 The existing baseline environment was established by identifying navigational features and shipping activity using various data sources. The main data sets used in the assessment are presented below.

- Shipping data including Automatic Identification System (AIS) and radar data collected over two 14-day periods in winter 2018 and summer 2019 (Ref. 1.7).
- Supplementary AIS and radar fishing vessel data collected over two 14-day periods in winter 2015 and summer 2016 (Ref. 1.7).
- Marine Management Organisation (MMO) satellite fishing data 2013-2017 (Ref. 1.8).
- Ten years of Marine Accident Investigation Branch data (2005-2014) (Ref. 1.9).
- Ten years of Royal National Lifeboat Institution (RNLI) incident data (2005-2014) (Ref. 1.10).
- UK Admiralty Charts 2019 (Ref. 1.11).
- Admiralty Sailing Directions, North Sea (West) Pilot, 10th Edition, 2016 (Ref. 1.12) and Dover Strait Pilot, 12th Edition, 2017 (Ref. 1.13).
- Aggregate Dredging Areas (The Crown Estate) (Ref. 1.14).
- Offshore Wind Farms (The Crown Estate) (Ref. 1.15).
- Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating 2.0 (Ref. 1.16).

Future baseline

1.3.22 As discussed above, baseline data have been obtained from the collation of existing information using recent data sets. The majority of vessels likely to be affected by the Sizewell C Project are fishing and recreational vessels.

Trends in fishing and recreational activity are difficult to predict. Fishing activity can depend on various influencing factors, such as fish stocks, quotas, Brexit, etc. Recreational activity can be impacted by factors, such as weather and economy. Climate change, including increased number of storm events, may reduce recreational activity, whilst an increase in temperatures may increase recreational activity. Overall, there is not anticipated to be any significant increase in the shipping activity presented in the baseline assessment.

- 1.3.23 For the purposes of this assessment, changes to baseline conditions in the future have been reviewed with respect to marine developments currently under construction.

ii. **Construction**

- 1.3.24 The assessment of risks during the construction phase uses the findings of the baseline assessment, along with consultation with local stakeholders, to identify potential risks relevant to marine navigation associated with construction of the marine infrastructure for the Sizewell C Project, including dredging activities, and the AIL deliveries. In summary, during construction the following risks were assessed:

- Increased risk of collision with proposed development's installation vessels.
- Increased risk of collision with proposed development's dredgers.
- Increased risk of collision with AIL vessels associated with the proposed development.
- Increased risk of AIL delivery vessel grounding.
- Disruption to fishing and recreational activities.
- Disruption to maintenance works on Galloper and Greater Gabbard offshore wind farm cables.

iii. **Operation**

- 1.3.25 Similarly, the assessment of risks during the operational phase uses the findings of the baseline assessment, along with consultation with local stakeholders, to identify potential risks relevant to marine navigation associated with the intake and outfall headworks, and AIL deliveries. In summary, during operation the following risks were assessed:

- Increased risk of collision with dredgers associated with the proposed development.
- Increased risk of collision with AIL delivery vessels.
- Increased risk of AIL delivery vessel grounding.
- Disruption to fishing and recreational activities.
- Passing vessel grounding on intake/outfall structures.
- Fish gear snagging.
- Risk from vessel anchors.
- Passing vessel foundering.

iv. Inter-relationships

1.3.26 Impacts to fishing vessels due to restrictions for access to fishing grounds are assessed in **Volume 2, Chapter 22 Marine Ecology and Fisheries** of the **ES**.

1.3.27 Furthermore, impacts to recreational craft due to disturbance of nearshore recreational activities are assessed in **Volume 2, Chapter 15 Amenity and Recreation** of the **ES**.

g) Assumptions and limitations

1.3.28 The following assumptions have been made in this assessment:

- The navigation baseline and impact assessment have been carried out based on the information available and consultation responses received at the time of preparation of the ES.
- Each phase of offshore construction (i.e. BLF, intake/outfall headworks, CDO, FRR) is intended to be completed within one calendar year.
- The duration of dredging works required for the BLF is estimated to be a maximum of 12 weeks. During the construction period, it is estimated that small scale dredging (approximately 10% of the initial

volume) will also be required at monthly intervals. A full scale dredge is anticipated annually due to infilling during winter periods.

- Marine piling for the BLF will be constructed using a walking jack-up barge or from the advancing BLF as construction progressed seawards. Given the low volume of materials, it is unlikely that there will be multiple trips.
- Vessel movements associated with the BLF are mainly related to deliveries. Accounting for weather downtime, there is expected to be a total of 200 beach landings over four annual campaigns of offshore works during construction. This equates to an estimated 50 AIL landings during each annual campaign (31st March to 31st October).
- It is estimated that AIL deliveries would occur once every five years during the operational phase and comprise very few individual deliveries.
- Dredging required prior to placement of the intake / outfall headworks is estimated to take a maximum of 12 weeks.
- Drilling of the shafts for the intake / outfall tunnels will be undertaken by a jack-up barge, with support vessels; estimated at 30 hours of drilling per head. It is estimated that a jack-up barge will be on location for a maximum of six months.
- The structures will be pre-built and lowered into place by crane vessels, with support vessels. This is likely to be completed within six months.
- Dredging will also be required prior to installation of the FRR and CDO.
- Other vessel movements associated with construction include support vessels such as guard boats, small survey vessels, support ribs, work boats, etc. These vessels are considered to pose a lesser risk to marine navigation compared to jack-up barges, crane vessels and dredgers, as they are smaller and not restricted in manoeuvrability.

1.3.29 The following limitations are noted:

- It is noted that anchoring will likely vary based on trade as well as weather and may not be fully represented by 28 days of survey data

(14 days summer and 14 days winter). However, this volume of data complies with the standard requirements for a NRA.

References

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VOLUME 1, CHAPTER 6, APPENDIX 6U: RADIOLOGICAL LEGISLATION AND METHODOLOGY

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Plates

None provided.

Figures

None provided.

1 Radiological Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant radiological effects of the Sizewell C Project. This appendix applies to the main development site only.

1.1.2 The methodology section sets out how the assessment to determine the likely significant effects of the Sizewell C Project presented in **Volume 2, Chapter 25** of the **ES** (Doc Ref. Book 6), has been carried out, which also links to the radiological effects section of the **Shadow Habitat Regulations Assessment (HRA) Report** (Doc Ref. 5.10), regarding the radiological impacts on habitats around the Sizewell C main development site, submitted with the application for development consent.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant radiological effects associated with the proposed development.

1.2.2 Legislation and policy have been considered on an international¹ and national level. The following legislation, policy and guidance are considered to be relevant to the radiological assessments undertaken.

a) International

i. Dredging assessment

1.2.3 The International Atomic Energy Agency provides worldwide guidance on prohibiting the disposal at sea of radioactive wastes and other radioactive matter for the purposes of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention 1972) (Ref. 1.1).

1.2.4 The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), signed and ratified by all Contracting Parties to the original Oslo or Paris Conventions, prohibits the dumping of

¹ At the point of submission of this application for development consent, the UK is within the transition period for exiting the European Union and the Euratom Treaty. The majority of requirements under the European and Euratom Directives identified through this ES have been implemented within UK domestic legislation, and as such post the transition period the requirements of these directives will remain in place. In addition, number of statutory instruments have been prepared and laid before Parliament address the UK departure from Euratom.

low and intermediate level radioactive substances including wastes (Ref. 1.2).

ii. Human Radiological Protection

1.2.5 The framework for radiation protection worldwide is based on the International Atomic Energy Agency Basic Safety Standard (Ref. 1.3). Although the International Atomic Energy Agency Basic Safety Standard has no legal standing per se, it is used by Member States as a basis for their legal radiological protection systems.

1.2.6 The scientific basis of the Basic Safety Standard Directive is based on the recommendations of the International Commission on Radiation Protection. Its latest published recommendations are International Commission on Radiological Protection 103 (Ref. 1.4).

1.2.7 Other organisations provide input into the International Atomic Energy Agency Basic Safety Standard (Ref. 1.3), including the Food and Agriculture Organisation of the United Nations; the International Labour Organisation; the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development; and the World Health Organization.

1.2.8 The principles for radiation protection described in the International Commission on Radiological Protection 103 (Ref. 1.4) recommendations are those of:

- Justification: Any decision that alters the radiation exposure situation should do more good than harm.
- Optimisation of protection: The likelihood of incurring exposures, the number of people involved and the magnitude of their individual doses should all be kept as low as reasonably achievable, taking into account economic and societal factors.
- Dose limitation: The total dose to any individual from regulated sources in planned exposure situations, other than medical exposure of patients, should not exceed the appropriate limits recommended by the International Commission on Radiological Protection.

Euratom Treaty

1.2.9 The Euratom Treaty (Ref. 1.5) came into force on 1 January 1958 and established a European Atomic Energy Community, widely known as Euratom. Under Articles 31 and 32 of the Treaty, the Commission of the European Communities is required to develop radiological protection standards for application in Member States in three formats:

- Regulations - Apply directly to Member States.
- Directives and Decisions of Council - Set goals and standards that must be translated into Member States legislation.
- Recommendations and communications – These are not mandatory.

1.2.10 Central to these and implementing the International Atomic Energy Agency Basic Safety Standard (Ref. 1.3) is a European Council Directive 2013/59/Euratom Basic Safety Standard dated 5 December 2013, which lays down a Basic Safety Standard for the protection of the health of workers and the general public against the dangers from ionising radiations. This Euratom Basic Safety Standard Directive (Ref. 1.6) also provides the dose coefficients required to calculate doses to members of the public from intakes of radionuclides.

1.2.11 The Euratom Basic Safety Standard Directive was implemented by the UK on 1 January 2018.

iii. Non-human Radiological Protection

1.2.12 International Commission on Radiological Protection Publication 103 describes a framework for assessing the impact of ionising radiation on non-human species (Ref. 1.4). This was designed to harmonise with the existing International Commission on Radiological Protection approach to the protection of human beings, but not to set regulatory standards. It sets out a systematic, risk-based approach to assessing radiological impacts on non-human species. Other organisations have developed assessment tools to determine the risk of radiation exposure to non-human species.

1.2.13 It is noted that the International Atomic Energy Agency (Ref. 1.3) and International Commission on Radiological Protection (Ref. 1.4) documents have no legal standing in their own right. However, they do influence the development of the legal system for radiation protection internationally.

1.2.14 Other regulatory regimes control the protection of non-human species, which require steps to maintain, and restore to favourable conservation status, the habitats and species of EU Community level interest. In the UK, the environmental permitting process is subject to the requirements of the Habitats Directive (Ref. 1.7) and the Birds Directive (Ref. 1.8) (as transposed into the UK legislation by the Conservation of Habitats and Species Regulations 2017 (Ref. 1.18)). The Environment Agency must demonstrate that it has met its obligations under these Directives (as transposed via the UK regulations) to ensure that no Environment Agency permitted activity

results in an adverse effect, either directly or indirectly, on the integrity of Natura 2000 sites² (Ref. 1.9).

iv. Transport

1.2.15 The International Atomic Energy Agency publishes regulations for the safe and secure transport of radioactive materials that give standards of safety for radiation, criticality and thermal hazards to persons, property and the environment due to the transport of radioactive materials. The regulations were first published in 1961 and have been subject to periodic amendments, the latest of which were published in 2009 (Ref. 1.10). The International Atomic Energy Agency also publishes supporting advisory material and guidance.

1.2.16 In addition, the United Nations publishes Recommendations on the Safe Transport of Dangerous Goods known as the “Orange Book” (Ref. 1.11) where goods are divided into nine classes, Class 7 being radioactive materials. An expert group of the Economic and Social Council of the United Nations issued a resolution (Ref. 1.12) that entrusted the task of establishing recommendations for the safe transport of radioactive materials to the International Atomic Energy Agency thus ensuring compatibility between International Atomic Energy Agency regulations (Ref. 1.10) and the “Orange Book” (Ref. 1.11).

b) National

i. Legislation

Dredging Assessment

1.2.17 The UK National Discharges Strategy 2005–2030 (Ref. 1.13) sets out what the Government wishes to see delivered in relation to its commitments under the 1992 Oslo and Paris (OSPAR) Convention (Ref. 1.2). This relates to reductions in radioactive discharges; reductions in concentrations of radionuclides in the marine environment; and reductions in human exposure to ionising radiation from radioactive discharges.

1.2.18 Any new nuclear power station needs permission before making any discharges of radioactivity into the environment or disposals of radioactive waste, under Schedule 23 of the Environmental Permitting (England and Wales) Regulations 2016 (Ref. 1.16), from the Environment Agency (in

² Natura 2000 is made up of sites designated as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) under Council Directives 2009/147/EEC on the conservation of wild birds (Ref. 1.8) and 92/43/EC on the conservation of natural habitats and wild flora and fauna (Ref. 1.7).

England). The site-specific radiological impact assessment is a key element underpinning the radioactive substances regulation (RSR) permit.

Human Radiological Protection

- 1.2.19 A number of Acts and regulations govern the exposure or potential exposure of workers and the general public to ionising radiations. The principal ones (that are supported by a wide range of codes of practice and / or guidance) are outlined below, together with their principal requirements.

The Nuclear Installations Act 1965

- 1.2.20 The Nuclear Installations Act 1965 (Ref. 1.14) governs nuclear installations in the UK by the issue of site licences by the Office for Nuclear Regulation (ONR). The licences cover a standard set of 36 detailed requirements to be addressed by a site licensee covering, for example, management systems; safety cases; plant safety; construction; plant modifications; operations, accumulation/disposal of radioactive waste and decommissioning.

Ionising Radiations Regulations 2017

- 1.2.21 Radiation exposure of the worker and the general public is regulated by the Ionising Radiations Regulations 2017 (Ref. 1.15). These regulations were made under the Health and Safety at Work etc. Act 1974 and implement elements of the Euratom Basic Safety Standard Directive (2013/59/Euratom) (Ref. 1.6). The Ionising Radiations Regulations 2017 places the duty on the radiation employer to restrict exposure so far as is reasonably practicable. Demonstration of so far as is reasonably practicable in the UK is achieved by the application of as low as reasonably practicable (ALARP). The Ionising Radiations Regulations 2017 requires the employer (or operator of a nuclear facility) to provide systems (engineered means, operational means and protective equipment) to reduce the radiation dose until the cost of implementing those measures (in time, trouble or money) is considered to be grossly disproportionate to the radiation risk averted.
- 1.2.22 The Ionising Radiations Regulations 2017 define the dose limits that meet the requirements of the International Commission on Radiological Protection (justification, optimisation and limitation as described above in **section 1.a**)) and also specify that radiation exposures and associated risks are assessed and demonstrated to be in line with ALARP. In the case of the general public, the effective dose limit is 1 milli-sieverts (mSv) per year from man-made sources.
- 1.2.23 As required under the Ionising Radiations Regulations 2017, a radiation risk assessment must be undertaken prior to the activity to demonstrate that:

- all hazards with the potential to cause a radiation accident have been identified; and
- the nature and magnitude of the risks to employees and other persons arising from those hazards (including under routine conditions) have been evaluated, and suitable controls put in place to eliminate or where elimination is not appropriate reduce the exposures to ALARP.

Environmental Permitting (England and Wales) Regulations 2016

- 1.2.24 The use, accumulation, storage, disposal and discharge of radioactive materials in the UK is regulated under the Environmental Permitting Regulations 2016 (Ref. 1.16). These require that a person must not operate a regulated facility except under the authorisation of an environmental permit issued by the relevant regulatory body. This includes undertaking activities with radioactive substances, where a person uses premises for the purposes of an undertaking and that person disposes of radioactive waste from those premises.
- 1.2.25 The Environmental Permitting Regulations are regulated by the Environment Agency in England, and contain the regulatory framework under which permits to make radioactive discharges (gas, solid or liquid) to the environment are issued to operators of premises, including licensed nuclear sites. On a nuclear licensed site, the accumulation of radioactive waste is regulated by the ONR under the Nuclear Installations Act 1965, particularly Licence Condition 32. A ‘Memorandum of Understanding’ between the Environment Agency and the ONR (Ref. 1.17) and is intended to ensure a consistent and seamless approach between the control of the radioactive wastes on the sites and any subsequent discharge or disposal.
- 1.2.26 The Environment Agency ensures that all exposures to ionising radiation of any member of the public and of the population as a whole resulting from the disposal of radioactive waste are kept as low as reasonably achievable (ALARA) taking into account economic and social factors (Ref. 1.55).
- 1.2.27 Another key principle to ensure optimisation is the use of Best Available Techniques (BAT). BAT means the latest stage of development of processes, of facilities or of methods of operation for limiting discharges, emissions and waste. The BAT outcome is likely to change with time when the technical, economic and social factors differ. The Environment Agency sets discharge limits for permitted sites based on the use of BAT by operators.
- 1.2.28 Permits to discharge radioactive waste are only granted after a rigorous assessment process which includes a requirement to complete a prospective assessment of the radiological impacts on the public. This includes impacts on human and non-human species. The prospective dose assessments are

determined using modelling. This is because it is not practicable to measure exposure directly (or in advance of the operations of the plant) and it is essential to show that any doses received would be below regulatory guidelines and also in accordance with the principles of ALARA (outlined above). Once these and other assessments are completed, there is a period of consultation on the Environment Agency's proposed decision as to whether to grant a permit. The permit is also likely to impose a wide range of requirements (known as conditions) to protect the public and environment by the permit holder. After issue, the permits are subject to periodic reviews by the Environment Agency.

1.2.29 Schedule 23, Part 3 of the Environmental Permitting Regulations implements the relevant requirements of the Basic Safety Standard Directive which are:

- all public ionising radiation exposures from radioactive waste disposal are kept ALARA;
- the sum of doses arising from such exposures does not exceed the individual public dose limit of 1 mSv per year;
- the individual dose from any single site relative to the combined impact from Sizewell B and Sizewell C (referred to as the site constraint) does not exceed 0.5 mSv per year; and
- the individual dose received from any new discharge source relative to Sizewell C only, includes direct radiation (referred to as the source constraint) since 13 May 2000 does not exceed 0.3 mSv per year.

Radiological Protection of Non-Human Species in the UK

1.2.30 In the UK there are no specific regulations for the protection of non-human species from radiation sources. However, UK regulations are in place to enforce the relevant European Directives in the UK, the main one being the Conservation of Habitats and Species Regulations 2017 as described in the international section above (Ref. 1.18).

Radiological Protection Due to Transport of Radioactive Material in the UK

1.2.31 In the UK, the European Agreements concerning the International Carriage of Dangerous Goods by road (Ref. 1.19) and by rail (Ref. 1.20) have been adopted in the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (Ref. 1.21). These regulations apply to the transport of radioactive materials by road and rail and detail any UK specific derogations. Dose limitation is enforced through the Ionising Radiation Regulations 2017 for both members of the public and workers.

ii. National Policy Statements

- 1.2.32** The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.22) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.23). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.33** The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.
- 1.2.34** NPS EN-1 is limited to non-radioactive waste and so is not specifically addressed in this assessment.
- 1.2.35** A summary of the relevant NPS EN-6 requirements, together with consideration of how these requirements have been taken into account, is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements

Ref.	NPS topic requirement	How the requirement has been addressed
EN-6 Section 2.11 and Annex B	<p>The Nuclear White Paper stated that “<i>before development consents for new nuclear power stations are granted, the Government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce</i>” (Ref. 1.24).</p> <p>In reaching its view on the management and disposal of waste from new nuclear power stations the Government has satisfied itself that:</p> <ul style="list-style-type: none"> geological disposal is technically achievable a suitable site can be identified safe, secure and environmentally acceptable interim storage arrangements will be available until a 	<p>A generic design assessment (GDA) for the UK EPR™ has already been carried out, providing a statement of design acceptability (SoDA) from the Environment Agency and design acceptability certificate from the ONR.</p> <p>As part of the site-specific permitting requirements for the proposed Sizewell C nuclear power station, a Radioactive Substance Regulation environmental permit is also being applied for pursuant to the Environmental Permitting Regulations.</p> <p>Management of solid radioactive waste and spent fuel is covered by the Solid Radioactive Waste</p>

Ref.	NPS topic requirement	How the requirement has been addressed
	<p>geological disposal facility can accept the waste.</p> <p>The Government is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations. As a result, the Secretary of State should not consider this question. However, there may be planning issues relating to the on-site management of radioactive waste which it is appropriate for the Secretary of State to consider as part of the development consent application.</p> <p>The Appraisal of Sustainability (AoS) of NPS EN-6 examined the impacts on sustainability if radioactive waste from new nuclear power stations is managed in line with the policies and processes considered by the Government in reaching its conclusion on this issue. The Government has taken into account the potential impacts identified in the (AoS) in making its assessment and has concluded that none of the potential sustainability impacts identified in the (AoS) prevent it from reaching its conclusion.</p>	<p>Assessment, provided in Volume 2, Chapter 7 of the ES.</p>

c) Regional

- 1.2.36 There is no regional policy deemed relevant to the assessment of radiological effects.

d) Local

- 1.2.37 There is no local policy deemed relevant to the assessment of radiological effects.

e) Guidance

- 1.2.38 This assessment has been undertaken in accordance with the following guidance documents:

i. **Dredging**

- The Annual Report on Radioactivity in Food and the Environment, the most recent at time of assessment being Radioactivity in Food and the Environment -20, 2015 (Ref. 1.25). However, more recent Radioactivity in Food and the Environment reports have been produced since and a comparison of the data has been carried out as part of the updated assessment to consider whether additional work was required, as provided in **Volume 2, Appendix 25A** of the **ES**.
- The concept of *De Minimis* for radioactive substances, initially discussed at the First Consultative Meeting of Contracting Parties to the London Convention, 1972. This has been regularly discussed and reported on by the International Atomic Energy Agency, and the most recent guideline – at the time of assessment - for the application of the *De Minimis* concept under the London Convention and Protocol comes from International Atomic Energy Agency - TECDOC-1759, 2015 (Ref. 1.26).

ii. **Human radiological impact assessment**

- Principles for the Assessment of Prospective Public Doses Arising from Authorised Discharges of Radioactive Waste to the Environment, 2012 (Ref. 1.27);
- Radioactive Substances Regulations Environmental Principles, 2012 (Ref. 1.28) and guidance from the Environment Agency on applying for the Environmental Permit for the Radioactive Substances Regulation (EP-RSR), 2011 (Ref. 1.29);
- National Dose Assessment Working Group guidance: Overview of Guidance, 2008; Guidance on Exposure Pathways, 2009; Guidance on Short Term Release Assessments, 2011 (Ref. 1.30, Ref. 1.31, and Ref. 1.32, respectively);
- Environment Agency's Independent Radiological Assessment guidance, 2006 (Ref. 1.33 and Ref. 1.34);
- Public Health England's guidance: Dose Coefficients for the Embryo, Foetus and Breastfed Infant, 2008; Atmospheric Dispersion, 1983 (Ref. 1.35 and Ref. 1.36, respectively); and
- PC-CREAM: Assessment of Radiological Consequences from Routine Releases to the Environment guidance, 2015 (Ref. 1.37).

iii. Non-human radiological impact assessment

- R&D 128: Impact Assessment of Ionising Radiation on Wildlife methodology guidance, 2001 (Ref. 1.38).
- Environmental risks from ionising contaminants: assessment and management tool guidance, 2007 (Ref. 1.39).

iv. Transport

- There are no specific guidance documents referenced beyond the regulations described above.

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic Environmental Impact Assessment (EIA) methodology is described in **Volume 1, Chapter 6** of the **ES**.

1.3.2 This section provides a summary of the radiological assessment methodology. The methodology has been split into the different assessments that have been carried out, these are each discussed in turn in the following sections.

1.3.3 As outlined in the 2019 EIA Scoping Report, included as **Appendix 6A** of this volume, this assessment does not address the management of solid radioactive waste or spent fuel which is described in **Volume 2, Chapter 7** of the **ES**. However, any radiological effects from the presence of radiological waste on site are accounted for within the radiological impact assessment. Additionally, the radiological impacts of decommissioning are considered to result in no further effects than those assessed for the routine operational activities, as no additional discharges are proposed during decommissioning. Therefore, these effects are not specifically detailed further in the radiological impact assessment presented in **Chapter 25 of Volume 2** of the **ES**. The likely significant effects of decommissioning will be confirmed prior to the start of decommissioning works as part of a separate EIA which will need to be undertaken in accordance with the relevant EIA Regulations, such as the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (Ref. 1.41) and the Marine Works (Environmental Impact Assessment) Regulations 2007 (Ref. 1.42). Refer to **Volume 2, Chapter 5** of the **ES** for further information.

1.3.4 There are no radiological impacts expected with any of the associated development sites. No radioactive disposals will take place from these locations during construction or operation.

- 1.3.5 Further information on the health implications associated with radiological impact of permitted disposals from the main development site are addressed in **Volume 2, Chapter 28** of the **ES**.
- 1.3.6 In-combination effects with radiological discharges that form part of the existing baseline, such as those associated with Sizewell A and Sizewell B, are addressed within the radiological impact assessment presented within **Volume 2, Chapter 25** of the **ES**. The potential for cumulative effects with other reasonably foreseeable developments is considered in **Volume 10, Chapter 4** of the **ES**.
- 1.3.7 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, as provided in **Appendix 6A** of this volume.
- 1.3.8 Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A** and **6C** of this volume.

b) Consultation

- 1.3.9 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. The Environment Agency were consulted on the human and non-human biota radiological impact assessments to inform the preparation of the Radioactive Substances Regulation environmental permit application and the assessment presented in this **ES**. Due to the approach being well developed, minimal comments on the approach adopted were raised.

c) Assessment background

- 1.3.10 The design of the Sizewell C nuclear power station, the UK EPR™, is effectively the same as that under construction at Hinkley Point C. The UK EPR™ is a pressurised water reactor drawing on aspects of previous designs and including additional evolutionary features that, among other things, reduce the amount of waste per unit electrical generation. Generation of electricity by all forms of pressurised water reactors unavoidably results in the generation of some liquid and gaseous radioactive effluents and solid radioactive waste. Techniques are applied to minimise the amount of radioactive effluents and waste generated, further abatement measures are used to reduce the amount of liquid and gaseous radioactive effluents discharged, as set out in the GDA for UK EPR™. Storage buildings and systems on the site are designed and built to minimise direct ‘shine’ of

radiation but nevertheless may result in very small addition to background radiation from natural radiation (such as soil or materials used in houses).

- 1.3.11 Discharges of aqueous radionuclides into the marine environment will be made via outfall structures to be constructed at two locations approximately 3.4 km distance offshore from the North Sea with Ordnance Survey (OS) grid references (651080, 264125) & (651155, 264125), as described in **Volume 2, Appendix 25B** of the **ES**. Releases of gaseous radionuclides into the atmosphere will be made via two emission stacks with physical heights of 70m, protruding approximately 10m above the reactor buildings housing the two UK EPR™ units, as described in **Volume 2, Appendix 25B** of the **ES**.
- 1.3.12 Sizewell A is defueled and is expected to have entered into the care and maintenance phase before the proposed Sizewell C power station begins generation and it is assumed that Sizewell A will still be in care and maintenance when Sizewell C has finished generation itself, as described in **Volume 2, Appendix 25B** of the **ES**. The assessment approach regarding in-combination discharges is described in sections below. Any future impacts associated with the decommissioning of Sizewell A or B would also be assessed under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (Ref. 1.41) and, where applicable, associated permit variations or applications.
- 1.3.13 More details on the operation of Sizewell C and the management of solid radioactive waste and spent fuel can be found in **Volume 2, Chapter 7** of the **ES**.
- 1.3.14 The methodologies for the assessment of potential radiological effects from the Sizewell C Project are described under the following sub-sections set out below:
- dredging for construction radiological impact assessment;
 - human radiological impact assessment;
 - non-human radiological impact assessment; and
 - transport radiological impact assessment.
- d) [Dredging radiological impact assessment methodology](#)
- i. [Scope of assessment](#)
- 1.3.15 The purpose of the dredging assessment is to evaluate the radiological exposure of members of the public associated with sea disposal of dredge sediment that contains trace levels of anthropogenic and natural radioactivity. The objective is to assess and quantify the radiological exposure of members

of the public and hence consider, and if required identify, control measures that need to be implemented.

- 1.3.16 The anthropogenic radionuclides that may be present in the sediment would be as a result of previously authorised disposal from existing or historical regulatory approaches and consented activities. The sediment is considered out of scope of regulation if it has been previously lawfully disposed of as a waste or is contaminated as a result of such a disposal, unless subject to a process which causes an increase in radiation exposure. In which case, only the radionuclides associated with the disposal should be considered when deciding whether the resulting dose is significant; background radioactivity can be discounted (Ref. 1.43).
- 1.3.17 This assessment follows the International Atomic Energy Agency recommended approach (Ref. 1.26) and is consistent with that undertaken for Hinkley Point C.
- 1.3.18 The dredging radiological impact assessment does not address Sizewell C operational discharges. These will only occur after dredging works have been completed and are not therefore relevant in this assessment (see human and non-human radiological impact assessment sections below for operational discharges).

ii. Study area

- 1.3.19 The study area for the dredging radiological impact assessment comprises areas subject to dredging, including the locations for cooling water intakes and outfall headworks.

iii. Methodology approach

- 1.3.20 This assessment considers artificial radionuclides that are clearly of anthropogenic origin and also radionuclides that occur naturally and are most likely to be presented at natural levels. These radionuclides have been included to ensure that the assessment is robust and bounding.
- 1.3.21 The assessment is based on the approach of International Atomic Energy Agency TECDOC-1759, a document which determines the suitability of radiological materials for disposal at sea (Ref. 1.26). An outline of the methodology is provided below.
- 1.3.22 The assessment considered annual individual dose (to the boat crew undertaking dredging and sediment disposal and other members of the public) and annual collective dose (again to the crew and to the public).

- 1.3.23 The International Atomic Energy Agency assumes that the two groups consist of different individuals. Thus, it is not appropriate to sum individual or collective doses between the crew and the public.
- 1.3.24 The annual collective dose is the sum of individual doses across the individuals exposed. The International Atomic Energy Agency methodology assumes that there is one dredging vessel with 10 crew members and that the public is exposed to radioactivity over a 10 km length of coastline.
- 1.3.25 The following exposure pathways have been considered in developing a specific assessment methodology for members of the crew:
- external exposure to radionuclides in the candidate material;
 - inadvertent ingestion of candidate material; and
 - inhalation of particles re-suspended from the surface of the candidate material.
- 1.3.26 The following exposure pathways have been considered for members of the public:
- external exposure to radionuclides deposited on the shore;
 - ingestion of seafood caught in the area around the dumping site;
 - inadvertent ingestion of beach sediments;
 - inhalation of particles re-suspended from beach sediments; and
 - inhalation of sea spray.
- 1.3.27 The International Atomic Energy Agency notes that its methodology does not consider other individuals who could be exposed to the radioactivity in the material because the doses that these individuals could receive are negligible compared to the exposure routes considered. Such individuals include, for example, swimmers and boaters who can receive doses through external exposure and ingestion of water while swimming or sailing.

iv. **Assessment criteria**

- 1.3.28 The International Atomic Energy Agency TECDOC-1759 (Ref. 1.26) states that radiological assessment for the protection of human health should include estimates of individual and collective doses for comparison with the radiological criteria for exemption. It then notes that:

“A practice, or source within a practice, may be exempted without further consideration provided that the following radiological criteria are met in all feasible situations:

(a) the effective dose expected to be incurred by any member of the public due to the exempted practice or source is of the order of 10 μ Sv or less in a year; and

(b) either the collective effective dose committed by one year of performance of the practice is not more than about 1 man Sv or an assessment for the optimization of protection shows that exemption is the optimum option.”

- 1.3.29 It has considered the annual individual and annual collective dose to the crew of a dredging boat and that to other members of the public. Exposure via a range of pathways has been considered using International Atomic Energy Agency dose per unit environmental concentration factors.
- 1.3.30 An individual dose of 10 μ Sv or less in a year is considered trivial, a ‘no danger’ level. This value should be assessed relative to the presence of anthropogenic radionuclides. Where levels of naturally occurring radionuclides are elevated by nuclear industry operations, this elevation also needs to be considered against the 10 μ Sv or less in a year value (but can exclude natural levels of natural radioactivity).
- 1.3.31 Waste materials that contain trace levels of anthropogenic elevated radioactivity do not need to be regulated as radioactive, if the radiological risk posed from their disposal is 10 μ Sv or less in a year. The Government provides activity concentration values below which materials do not need regulation under the RSR environmental permit (Ref. 1.43).
- 1.3.32 Any radioactivity in dredged sediment due to anthropogenic activities is due to past discharges, however, disposal following dredging would be regulated under the RSR environmental permit if an individual dose of more than 10 μ Sv was incurred.
- 1.3.33 Based on the points above, the RSR environmental permit as applied in England, is consistent with the requirements of the London Convention 1972 and the 1992 Oslo Paris Convention and an exposure of 10 μ Sv or less in a year is considered to represent ‘no danger’ where no radiological protection activities are required. For the purposes of the EIA, an exposure of 10 μ Sv or less in a year is considered to constitute ‘no significant effect’.

v. Result categories

1.3.34 Sediment samples have been analysed for a comprehensive range of radionuclides. The results are divided into two groups:

- Anthropogenic radionuclides typical of the nuclear industry: Co-60, Cs-137 and Am-241.
- Natural radionuclides that may be elevated due to anthropogenic activity, but nonetheless, would still be present in the absence of any nuclear industry activity: Ra-226, Th-232 and U-238.

1.3.35 Where values sampled were below detection limits, the limit of detection value has been used in this assessment. This is precautionary and in reality, the actual values may be much less.

vi. In-combination assessment

1.3.36 No specific in-combination assessment has been conducted for the dredging radiological impact assessment, as any radioactivity from dredging sediments is unlikely to combine with other radiological discharges from Sizewell B or Sizewell A, and even should this occur, the resultant effect would not be beyond that considered in **section 1.3(d)(v)**.

e) Human Radiological Impact Assessment Methodology

i. Scope of assessment

1.3.37 The scope of human radiological impact assessment considers the radiological impacts associated with the operational radioactive discharges from the proposed development. This includes radiological impacts from gaseous and liquid discharges to the atmosphere and the marine environment respectively resulting from routine operations. There will not be any disposal of radioactive effluents to groundwater during construction or operation, therefore no radiological impact assessment on groundwater has been undertaken.

ii. Study area

1.3.38 The geographical extent of the study area for this assessment includes:

- the proposed Sizewell C main development site, as provided in **Figure 2.2, Volume 2, Chapter 2** of the **ES**; and
- communities within a radius of approximately 20km of the proposed Sizewell C power station.

iii. Methodology approach

- 1.3.39 Fission and activation products released from reactor operations are relatively constant throughout the site fuel-use cycle and hence consistent throughout any annual period. Assessment of continuous discharges is therefore appropriate for most radionuclides discharged and is discussed in this section. For the assessment of continuous discharges from Sizewell C, the approach advocated by the National Dose Assessment Working Group (Ref. 1.30) has been adopted. An initial dose assessment (Stage 1 and 2) was performed using the Excel based initial radiological assessment tool developed by the Environment Agency, based on their initial radiological assessment methodology (Ref. 1.33, Ref. 1.34).
- 1.3.40 The initial assessment was then followed by a detailed, more realistic assessment using site-specific assessment parameters in accordance with the regulatory requirements for radiological assessments carried out to support environmental permit applications for nuclear facilities (Ref. 1.29).
- 1.3.41 Assessments have been carried out based on the proposed annual discharge limits (and using best performance values as part of a sensitivity analysis) for aqueous and gaseous radionuclides anticipated to be discharged by Sizewell C. These assessments assume that radionuclide discharges are made in a continuous, routine and uniform manner and are consistent through a 60-year operational period. The assessment uses the concentration of radionuclides in the environment in the final year of operation to account for any accumulation that might occur. In this way, the assessment is precautionary.

Short term dose assessment criteria

- 1.3.42 The short term dose assessment includes dispersion modelling, food concentration calculations, representative members of the public, habits data and the dose calculation.
- 1.3.43 Short-term doses were calculated by combining the ADMS modelled environmental concentration data with habits data and the appropriate dose coefficients, using the relationships described in NRPB-W54 (Ref. 1.46).
- 1.3.44 Dose coefficients for inhalation and ingestion of food were taken from the PC-CREAM 08 User Guide (Ref. 1.47). External dose coefficients (for immersion in plume and from deposited material, and skin dose) were taken from FGR12 (Ref. 1.48) and corrected using radiation weighting factors from International Commission on Radiological Protection Publication 60 within the Radiological Toolbox software (Version 3.0.0) (Ref. 1.49).

- 1.3.45 External dose from radionuclides deposited on the ground and inhalation dose from resuspended radionuclides continues to occur after the plume has passed. Total dose over a year was therefore calculated for these pathways. Radioactive decay of radionuclides over the year was accounted for in the external dose from ground calculation. As the concentration of resuspended material in air varies with time, the integrated resuspended activity concentration over the year was calculated according to the method set out in NRPB-W54 (Ref. 1.46) and divided by the number of days in a year to determine the average air concentration from resuspended material for the year.

Collective dose assessment criteria

- 1.3.46 Collective dose is the sum of doses received by members of a population from all the significant exposure pathways from a given source. It is a means by which the radiological impact on society rather than the individual is assessed. The concept of collective dose can be a useful tool in optimising the level of radiological protection. For instance, it can help to ensure a proper balance between individual and societal protection. As captured within Principle 12 of the principles guidance document (Ref. 1.27):

“For permitting or authorisation purposes, collective doses to the populations of UK, Europe and the World, truncated at 500 y, should be estimated.”

- 1.3.47 Wherever practicable, doses should be distributed in a way which is equitable and a reduction in doses to members of the public may not be justified if it results in a very high individual dose to a worker, or group of workers.
- 1.3.48 There is no legal dose limit on collective doses. However, the International Atomic Energy Agency has presented a dose criterion of less than 1 man Sievert per year of operation, below which doses are considered sufficiently low that doses arising from sources or practices may be exempted from regulatory control. This criterion is included in regulatory guidance (Ref. 1.55).
- 1.3.49 The average individual dose within a population can be determined by dividing the collective dose by the number of people exposed. This value, known as a per caput dose, gives an indication of the individual risk across a population. The per caput dose and annual dose to the representative person from aqueous, gaseous and external radiation (including direct radiation and skyshine) gives an indication of the potential health risks associated with the operation of a particular facility³.

³ The term “representative person” replaces the previously used term “average member of the critical group”.

- 1.3.50 The UK regulatory agencies and advisory bodies consider that the risks associated with annual average per caput dose in the nSv range are trivial and should be ignored in the authorisation decision-making processes (Ref. 1.27). In terms of the collective dose to population groups, the UK regulatory agencies and advisory bodies have stated that the risks associated with per caput dose in the nSv/y range, or below, are miniscule and should be ignored in the decision-making processes (Ref. 1.54). Higher doses of the order of a few $\mu\text{Sv/y}$ can be considered to be trivial, but may require further consideration particularly if at the upper end.

Build-up radiological assessment criteria

- 1.3.51 The build-up of radionuclides discharged from Sizewell C in the local marine and terrestrial environments by the end of operational life of Sizewell C have been assessed.

Build-up of radionuclides in the marine environment

- 1.3.52 The build-up of radionuclides in the local marine environment (marine sediment and seawater) has been calculated within the DORIS module of PC-CREAM 08. The assessment criteria used the proposed annual limits of discharge based on the proposed annual discharge limits for Sizewell C.

Build-up of radionuclides in the terrestrial environment

- 1.3.53 The build-up of radionuclides in the terrestrial environment (soils) was calculated by modelling the deposition rates of relevant radionuclides (isotopes of caesium, cobalt and iodine, along with progeny where appropriate) for unit releases within the PLUME module of PC-CREAM 08. PLUME allows the scaling of model outputs to meteorological data and the Sizewell C site-specific meteorological data were applied to the model outputs.

- 1.3.54 Soil concentration factors for unit deposition rates ($\text{Bq/m}^2/\text{s}$) taken from the FARMLAND module of PC-CREAM 08 were then applied to the PLUME output and the results scaled to the proposed annual discharge limits for Sizewell C.

Build-up of radionuclides in freshwater environments

- 1.3.55 The area around Sizewell C also comprises freshwater bodies (lakes). PC-CREAM 08 does not contain a model for radionuclide transfer in lakes. The build-up of radionuclides deposited in a lake was therefore calculated using the SRS-19 screening model for a small lake (Ref. 1.50). The SRS-19 comprises simple, linear compartmental models suitable for undertaking pessimistic screening calculations of radionuclide dispersion for a range of

environments (lakes, estuarine, river, coastal and atmospheric environments).

- 1.3.56 Radionuclide deposition rates were modelled within the PLUME module of PC-CREAM 08 at the proposed annual discharge limits for Sizewell C.

Dose to future users of sea and land due to build-up of radionuclides in the marine and terrestrial environment

- 1.3.57 In the terrestrial environment:

- The potential exposure of future Sizewell C site users that could arise from the build-up of radionuclides deposited onto the land from gaseous releases to the atmosphere is assessed using the methodology described in NRPB-W36 (Ref. 1.51). The construction worker scenario is considered to represent the limiting case and to provide a bounding assessment for other members of the public. The dose was assessed at the point in time at the end of the operational life of the power station (60 years).
- The NRPB-W36 methodology provides a set of values for dose per unit activity concentration in soil for 36 radionuclides (Ref. 1.51). The dose to a construction worker was calculated by scaling the dose per unit activity concentration values to the calculated soil concentration values from build-up of radionuclides in the terrestrial environment.

- 1.3.58 In the marine environment:

- Given that the source term and marine modelling parameters (Sizewell local compartment with dose calculated in environmental concentrations after 60 years of discharge) remain the same as considered earlier, no further dose assessment has been carried out.

Sensitivity Analysis

- 1.3.59 Prospective radiological impacts assessments are characterised by uncertainties inherent in the models and parameters used to quantify the dispersion and accumulation of radionuclides in the environment, as well as variability associated with assumptions regarding the habits of the assessed population and their consequent exposures (Ref. 1.27 and Ref. 1.59). The Environment Agency recommends that a review of uncertainty and variability associated with key assumptions used in dose assessment be carried out in the event that the estimated dose to the representative person exceeds 20 $\mu\text{Sv/y}$. This is to provide confidence that an appropriate level of caution has been applied, but also to ensure that the assessment is not overly pessimistic (Ref. 1.27).

1.3.60 The European Commission suggested that performing sensitivity analysis is a useful exercise for identifying the input parameters with the greatest influence on estimated doses (Ref. 1.52). This involves changing the assumptions and parameters used in dose assessments and observing the effects of these changes on estimated doses.

1.3.61 Sensitivity analyses of the key assumptions and parameters used to assess the radiological impacts of aqueous and gaseous discharges from Sizewell C have been carried out. In keeping with the recommendation for taking a proportionate approach (Ref. 1.27), the sensitivity analysis for Sizewell C focussed on food ingestion pathways which account for between 87% and 99% of the dose to the majority of candidate representative persons assessed. The specific assumptions and parameters analysed are:

- Discharges - expected best performance discharges against proposed limits.
- Habits Data - generic food ingestion rate against site-specific food ingestion rates.
- Food Source – 100% locally sourced seafood against 50% locally sourced seafood.

iv. **Result categories and criteria**

1.3.62 Candidates considered as representative persons for the following exposures are as follows:

- Exposure to aqueous discharges from routine operations at Sizewell C – a fishing family, houseboat dweller and a wildfowler. The family included an adult, child, and infant.
- Exposure to gaseous discharges from routine operations at Sizewell C – a farming family and a worker at the neighbouring Sizewell B facility. The family included an adult, child, and infant.
- External dose from direct radiation from Sizewell C – a dog walker, a local resident and a worker at the neighbouring Sizewell B facility.
- Exposure to combine aqueous and gaseous discharges and from exposure to direct radiation from Sizewell C – a fishing family. The family included an adult, child, and infant.
- Short-term dose from planned continuous releases – a farming family. The family included an adult, child, and infant.

- Collective dose from discharges of aqueous radionuclides to the marine environment from Sizewell C – UK, European and World populations; and
- Build-up of activity from gaseous radionuclide deposition in the environment over the lifetime of the operation of Sizewell C – a construction worker.

Dose assessment criteria

1.3.63 The criteria used for determining the magnitude of radiological impacts on individual members of the public are based upon the constraints summarised in the below, **Table 1.2**. These criteria transpose the requirements of the Basic Safety Standard Directive (Ref. 1.6) and are largely based on the recommendations of the International Commission on Radiological Protection (Ref. 1.4). The radiological exposure criteria serve as benchmarks against which the predicted doses from permitted discharges from the proposed Sizewell C nuclear power station are compared. For the purposes of the EIA, doses below the criteria set out in **Table 1.2** are considered to constitute ‘no significant effect’.

Table 1.2: UK Dose Limits, Constraints and Guidelines derived from International and European Regulations and Guidance

Dose	Source of the Dose Criterion Used in the Assessment
1.0 mSv y ⁻¹	An annual dose limit of 1,000 μSv y ⁻¹ to a member of the public from all historical, current and future sources of radioactivity subject to control.
0.5 mSv y ⁻¹	A site dose constraint of 500 μSv y ⁻¹ to a member of the public from future planned operational discharges (excluding direct radiation) from multiple sources with contiguous boundaries at a single location. This applies to the combined discharges for Sizewell B and C.
0.3 mSv y ⁻¹	A dose constraint of 300 μSv y ⁻¹ to a member of the public due to future planned operational discharges and direct radiation arising from a single new source. For the purpose of legislation, Sizewell C is considered a single new source. It is noted that in 2009 the Health Protection Agency, now part of Public Health England, recommended that the UK Government implement a dose constraint not exceeding 150 μSv y ⁻¹ for members of the public in respect of new nuclear power stations and waste disposal facilities, in recognition of the fact that the design stage of such facilities presents an opportunity to reduce exposures to the public (1.44). However, this recommendation is not recognised as a statutory requirement ⁴ .
0.02 mSv y ⁻¹	The Environment Agencies, Health Protection Agency and the Food Standards Agency recognise that where doses are below the former threshold of optimisation (less than 0.02 mSv y ⁻¹) or are below regulatory concern (less
0.01 mSv y ⁻¹	

⁴ It was not incorporated in the 2018 revision of EPR™ 16 which implemented the requirements of the 2013 BSS.

Dose	Source of the Dose Criterion Used in the Assessment
	<p>than 0.01 mSv y⁻¹) then the effort to make assessments more realistic may not be warranted (Ref. 1.27). An annual dose of 10 to 20 µSv y⁻¹ (0.01 to 0.02 mSv y⁻¹) can be broadly equated to an annual risk of death of about one in a million per year. Nonetheless, the standard Environment Agency permit conditions under EPRTM16 (for instance that for Hinkley Point C (Ref. 1.45)) is specific in the requirement that the operator shall use the BAT in respect of the disposal of radioactive waste pursuant to the permit to:</p> <ul style="list-style-type: none"> • minimise the activity of gaseous and aqueous radioactive waste disposed of by discharge to the environment; • minimise the volume of radioactive waste disposed of by transfer to other premises; and • dispose of radioactive waste at times, in a form, and in a manner to minimise the radiological effects on the environment and members of the public.

1.3.64 The Environment Agency recommends (Ref. 1.27) that a review of uncertainty and variability associated with key assumptions used in dose assessment be carried out in the event that the estimated dose to the representative person exceeds 20 µSv y⁻¹. The specific assumptions and parameters analysed were:

- Discharges - expected best performance discharges against proposed limits.
- Habits data - generic food ingestion rate against site specific food ingestion rates.
- Food source – 100% locally sourced seafood against 50% locally sourced seafood.

1.3.65 These criteria apply to all exposure categories listed above.

v. In-combination assessment

1.3.66 The assessment of impacts from radiological discharges to the atmosphere and the marine environment will be considered in-combination with discharges from Sizewell B. This in-combination assessment is based on:

- the current permitted discharge limits from Sizewell B and the limits that are proposed for Sizewell C within the RSR permit application;
- the status of Sizewell A is currently defuelled and is expected to have entered care and maintenance phase before the proposed Sizewell C begins operations. Discharges from Sizewell A have not been included

in the assessment of in-combination effects from the combined Sizewell sites; and

- Sizewell B will be shut down and is planned to enter decommissioning in 2035. It is assumed that the discharges from Sizewell B during decommissioning will not increase above current permitted limits. Any changes to the proposed limits at Sizewell B would be subject to regulatory review and approval.

1.3.67 The RSR permit application includes dose constraints to ensure the impacts of neighbouring sites are also considered in the radiological assessment. Therefore, the human and non-human radiological impact assessment include an in-combination assessment in addition to the Sizewell C assessment.

f) Non-human radiological impact assessment methodology

i. Scope of assessment

1.3.68 The scope of assessment considers the radiological impacts associated with the operational radioactive discharges from the proposed main development site. This includes radiological impacts from gaseous and liquid discharges to the atmosphere and the marine environment respectively resulting from routine operations. There will not be any disposal of radioactive effluents to groundwater during construction or operation, therefore no radiological impact assessment on groundwater has been undertaken.

ii. Study area

1.3.69 The geographical extent of the study area for this assessment includes:

- the proposed Sizewell C main development site, as provided in **Figure 2.2, Volume 2, Chapter 2** of the **ES**; and
- habitats of interest in the vicinity of the proposed Sizewell C main development site, as set out in **Volume 2, Appendix 25C** of the **ES**.

iii. Methodology approach

1.3.70 The assessment of radiological impacts due to discharges from Sizewell C and the neighbouring Sizewell B facility on non-human biota was undertaken using the Environment Risks from Ionising Contaminants: Assessments and management Integrated Approach tool (Ref. 1.39) and the associated FREDERICA database (Ref. 1.53). Environmental risks from ionising contaminants: assessment and management is the internationally accepted assessment tool.

- 1.3.71 The environmental risks from ionising contaminants: assessment and management tool is a multi-tiered software programme with supporting databases that allows the assessment of absorbed dose rates to a set of reference organisms that are representative of those commonly found in terrestrial, freshwater and marine ecosystems, for a range of radionuclides. The environmental risks from ionising contaminants: assessment and management reference organisms incorporate the International Commission on Radiological Protection's reference animals and plants (Ref. 1.60) as well as some species protected under European legislation. It is an internationally recognised tool for non-human biota radiological assessments.
- 1.3.72 The Environment Agency's R&D128 methodology (Ref. 1.38) was used to assess the impacts of releases of noble gases, which are not currently included in the environmental risks from ionising contaminants: assessment and management approach. The Environment Agency's R&D 128 methodology was developed for the assessment of radiological impacts on Natura 2000 sites for compliance with the Habitats Directive (Ref. 1.7). The methodology is accompanied by an Excel spreadsheet-based model which uses a similar approach to that of the environmental risks from ionising contaminants: assessment and management tool, but considers a smaller range of organisms and radionuclides. The assessment of impacts on non-human biota due to releases of noble gases from Sizewell C, which constitute the largest component of predicted gaseous releases from the facility in terms of activity released, is not possible using the environmental risks from ionising contaminants: assessment and management tool. Such assessments can however be carried out using the R&D 128 methodology (which incorporates representative noble gases) and the R&D 128 approach was used to calculate the dose rates to organisms occupying Habitat 1 (see definition below) arising from the discharge of noble gases from Sizewell C.
- 1.3.73 The dispersion and subsequent environmental accumulation of radionuclides discharged from the Sizewell C facility were modelled using the supporting modules within the PC-CREAM 08 software (Ref. 1.37). This is a well-established software system used by operators and regulators for human and non-human biota dose assessment modelling. Site-specific model parameters were used to provide realistic estimates of environmental concentrations arising from radionuclide releases.

iv. **Assessment criteria**

- 1.3.74 Site-specific data from the ecological surveys carried out have been used as a basis for selecting the habitats and species of interest with respect to radiological impacts on non-human species. This was to determine whether any adverse effects on radio-sensitive species are present.

- 1.3.75 The European research project, framework for assessment of environmental impact, (Ref. 1.61) summarised and reviewed the current knowledge of radiation effects on biota and provided a basic dosimetric models and assessment framework for fauna and flora.
- 1.3.76 The approach to protect non-human species against ionising radiation suggested by framework for assessment of environmental impact along with the International Commission for Radiological Protection is conceptually similar to environmental protection against hazardous chemicals.
- 1.3.77 Using radio-ecological models and simplified dosimetric models, the potential exposure of reference organisms can be calculated and compared to dose rate⁵ levels ('thresholds') below which no observable effects are expected to occur.
- 1.3.78 Based on international scientific studies it was concluded that the threshold for statistically significant effects in a number of organisms is 100 µGy per hour. Allowing for the dose rate from natural background, which at most is about 60 µGy per hour, the UK Environment Agency have adopted a value of 40 µGy per hour as the level below which they consider there will be no adverse effect on non-human species (Ref. 1.62). Therefore, assessments falling below this regulatory screening level are assumed to cause no measurable harm to non-human species, this is highlighted in the assessment results analysis.
- 1.3.79 In addition, the internationally accepted assessment tool, environmental risks from ionising contaminants: assessment and management (Ref. 1.63) includes the conservative screening dose rate of 10 µGy per hour which has also been referred to in SZC Co.'s assessment. This is a factor of 4 lower than the regulator's current assessment value. For the purposes of the EIA, a dose rate below 10 µGy h⁻¹ is considered to constitute 'no significant effect'.
- v. Result categories
- 1.3.80 In order to gather appropriate and aligned data typical of the major environment the International Commission on Radiological Protection has developed a set of reference animals and plants.
- 1.3.81 Five indicative habitats representative of designated areas found locally around the proposed Sizewell C main development site have been identified

⁵ Radiation energy that is absorbed by matter is measured in units called "grays". The levels concerned with in the context of non-human biota are measured in 1 millionths of a gray, known as micro-gray. Where a dose rate is a measure of exposure to radiation with units of micro-Gray (µGy) over a period of time.

as potentially sensitive to radiological impacts due to their ecological significance and their location relative to the proposed Sizewell C main development site. There are:

- Habitat 1, a terrestrial habitat, representative of Sizewell Marshes Site of Special Scientific Interest (SSSI), lies adjacent and to the west and north of the main development site. This terrestrial habitat was selected as it will experience the highest air concentrations and deposition due to both proximity to the site and being in the direction of maximum air concentrations, as modelled in PC CREAM, provided in **Volume 2, Appendix 25C** of the **ES**. The dose rates calculated will therefore be the highest of the terrestrial habitats of interest.
- Habitat 2, a marine habitat, representative of the Outer Thames Estuary Special Protection Area (SPA) area to the east of the main development site.
- Habitat 3, a coastal habitat, representative of the area to the north of the Sizewell main development site within the Minsmere-Walberswick Heaths and Marshes SSSI, SPA and Ramsar includes both shoreline and the adjacent terrestrial area. This habitat is therefore assumed to be impacted by both aqueous and gaseous discharges.
- Habitat 4, a freshwater habitat, representative of the scrape in the centre of Minsmere Nature Reserve, within Minsmere-Walberswick Heaths and Marshes SPA.
- Habitat 5, encompasses a mixed habitat representative of the marshland within the Minsmere-Walberswick Heaths and Marshes SSSI, SPA and Ramsar.

1.3.82 The model used does not consider the specifics of whether the environment is marine, chalk or heath, etc. Only generic biotas types and their general ecological behaviour are considered. The environmental risks from ionising contaminants: assessment and management tool is used to modify the 'concentration ratio' values that are used to predict the organism burden relative to an environment concentration. Generic values for the concentration ratios have been used for this assessment for the terrestrial environment, based on the default values within the environmental risks from ionising contaminants: assessment and management tool.

vi. In-combination assessment

1.3.83 In-combination assessment as described **section 1.3v)** of this appendix also applies to the non-human biota assessment.

g) Transport radiological impact assessment methodology

i. Scope of assessment

1.3.84 This assessment is to assess the potential radiological impact from the transportation off-site of radioactive materials and wastes to members of the public.

1.3.85 The assessment of other transport effects of the Sizewell C Project is presented within **Volume 2, Chapter 10** of the **ES**.

ii. Study area

1.3.86 The geographical extent of the study area for this assessment includes:

- the proposed Sizewell C main development site, as illustrated in **Figure 2.2, Volume 2, Chapter 2** of the **ES**; and
- the general public potentially exposed to radioactive materials and waste during transportation on the road and rail network.

iii. Methodology approach

1.3.87 A generic assessment has been undertaken to estimate the dose from the transport of these materials to and from the site.

1.3.88 Two assessments have been undertaken:

- Representative model - The first assessment uses dose rate values, exposure times and distances from the source and the receptor from Jones and Cabianca (2017) (Ref. 1.58). This approach is reasonably conservative, using recent data on both exposure times and distances and a conservative source term. This assessment presents a more realistic indication of the likely impact of transport to and from the Sizewell C main development site.
- Pessimistic / Bounding model - For comparison purposes a second assessment has been undertaken which uses the maximum legal dose rate for the particular transport package as the source term for the assessment. The exposure times and distances are kept in line with those used in the representative model. This assessment calculates the bounding dose for the transport of radioactive materials and waste to and from the Sizewell C main development site above which the legal limits on transport are at risk of being breached.

iv. Assessment criteria

- 1.3.89 During construction and routine operation of Sizewell C, radioactive materials will be transported by a combination of road and rail haulage. Due to the nature of radioactive materials, it is important to ensure that radiation exposure to both the personnel involved in handling, stowage and transport of the materials and the general public is ALARP and is compliant with best practice / relevant good practice. For the transport of radioactive materials, it is imperative that exposure must be minimised; ensuring that at all times the ALARP process is followed. Transport dose assessments provide assurance that during normal operations the dose to both transport workers and the general public will be minimised to ALARP and is compliant with best practice.
- 1.3.90 The Ionising Radiations Regulations 2017 state an annual dose limit for members of the public of 1 mSv yr⁻¹ (by way of comparison the legal limit for non-classified radiation workers is 6 mSv yr⁻¹ and for classified radiation workers under the Ionising Radiations Regulations the limit is 20 mSv yr⁻¹). For the purposes of the EIA, doses below the limits set out within the Ionising Radiations Regulations 2017 are considered to constitute 'no significant effect'.

v. Result categories (Transport types)

- 1.3.91 The purpose of the transport radiological impact assessment is to predict exposure dose to the general public associated with the transportation of radioactive materials and waste from a combination of road and rail shipment scenarios. No radioactive materials and wastes are assumed to be transported by sea. The groups of identified persons included in the assessment are as defined within Jones and Cbianca (Ref. 1.58). These include:
- A - Habitant of local town (Outside) - This assumes a member of the public is stood at a set of traffic lights, when the vehicle transporting the radioactive material or waste stops 2m from the member of the public for 1 minute per consignment. It is assumed that the same member of the public is exposed for every consignment of that particular type of radioactive material or waste over the year.
 - B - Habitant of local town (Inside) - This assumes a member of the public lives near a set of traffic lights and the vehicle transporting the radioactive material or waste stops 5 m from the member of the public for 1 minute per consignment. It is assumed that the same member of the public is exposed for every consignment of that particular type of radioactive material or waste over the year.

- C - Member of the Public at the Railhead – The majority of spent fuel packages will be moved via rail. A member of the public is assumed to be standing 23 m from the railhead for 15 minutes per consignment. It is assumed that the same member of the public is exposed for every consignment of spent fuel over the year.

1.3.92 Scenario A and B model the dose to the habitant from radiography sources used during construction, low level radioactive waste, new fuel and spent fuel, whilst the Scenario C only models spent fuel as the other sources of radioactivity are unlikely to be moved by rail.

1.3.93 The types of radioactive materials and waste assessed in the transport assessment are as follows:

- transport of radiography sources used during construction of the power station;
- transport of low level wastes from Sizewell C to another suitably permitted radioactive waste disposal site in the UK during routine operations;
- transport of new fuel to Sizewell C during the operational lifespan of the site; and
- transport of spent fuel from Sizewell C once operations cease.

vi. In-combination assessment

1.3.94 No specific in-combination assessment has been conducted for the transport radiological impact assessment.

h) Establishing the baseline

i. Existing baseline

1.3.95 The historical and current permitted discharges from the Sizewell A & B power stations as well as the historic impacts of atmospheric weapons testing, the Chernobyl accident and naturally occurring radioactivity all contribute to the background radioactivity levels around the Sizewell C main development site.

1.3.96 SZC Co. has undertaken surveys and monitoring programmes in order to obtain a more detailed understanding of the background radioactivity levels around the Sizewell C main development site and of the potential implications of any planned radiological discharges. Refer to **Volume 2, Chapter 18** of the **ES** for further information on radiochemical data assessment for existing soils, groundwater and surface water.

- 1.3.97 Baseline information is also available from the Radioactivity in Food and the Environment reports which gather data across all nuclear sites and is administered by the relevant regulatory bodies including the Environment Agency and Foods Standards Agency. Results have been gathered from land quality surveys and water quality surveys (Ref. 1.59).
- 1.3.98 To inform the dredging radiological impact assessment, SZC Co. has obtained samples of material from the locations of the cooling water intakes and outfall headworks. On obtaining the samples, no sediment was found at these locations, therefore a sample of bedrock material was collected and analysed.
- 1.3.99 Prior to analysis, the samples were dried, ground and homogenised. The analysis was completed using high-resolution gamma spectrometry calibrated to measure a range of radionuclides and gamma emitters in the energy range of 60keV and 2MeV. The assessment has used mean and maximum activity concentration data (Bq/kg dry weight) as set out in the International Atomic Energy Agency TECDOC-1759 (Ref. 1.26).
- 1.3.100 Previous sediment samples from locations closer to the shoreline were also assessed and these results and associated analysis has been included in **Volume 2, Appendix 25A** of the **ES**.
- 1.3.101 All samples were analysed for a comprehensive range of radionuclides. With regards to the more recent bedrock samples, all results of anthropogenic activity were below the limit of detection. Furthermore, the levels of identified naturally occurring radionuclides were consistent with those from the first sediment samples, which gave confidence in the validity of their results. Therefore, the first assessment based on easily dispersed mobile sediment, as opposed to immobile bedrock, is considered most appropriate and bounding. If considered, the bedrock would only reduce the dose even further.

ii. Future baseline

- 1.3.102 A review of cumulative schemes has been undertaken to confirm whether there are any new planned radiological discharges to be introduced within the study area before the start of construction and operation of the proposed development. No new schemes have been identified and therefore, the future baseline radiation levels have been assumed to be equivalent to the current baseline for the purposes of this assessment.

i) Inter-relationships

- 1.3.103 Potential inter-relationships effects relevant to the radiological impact assessment include:

- Effects on human health due to radiological discharges and impacts related to other assessments presented within the **ES** (e.g. air quality, noise and transport). These effects are assessed in **Volume 2, Chapter 28**, ‘Health and Wellbeing’, of the **ES** and therefore have not been considered further in this chapter.
- Effects on habitats due to radiological discharges in-combination with other effects identified in **Volume 2, Chapter 14** of the **ES**: ‘Terrestrial Ecology and Ornithology’ and **Volume 2, Chapter 22** of the **ES**: ‘Marine Ecology and Fisheries’. These effects are assessed in **Chapters 14 and 23** and therefore have not been considered further in this chapter.

j) **Assumptions**

1.3.104 The following assumptions have been made in this assessment:

- It is assumed that the radioactive discharges from commissioning of Sizewell C will be no greater than those during operation, therefore, for the purposes of this assessment it is assumed that the impacts from commissioning will be bounded by those for the operation of Sizewell C;
- The assessment of impacts from radiological discharges to the atmosphere and the marine environment have been considered in-combination with operations at Sizewell B;
 - This assessment is based on discharges at current permitted limits for Sizewell B, and the limits applied for Sizewell C in the RSR permit application.
 - This assumes that discharges from Sizewell B continue throughout the operation of Sizewell C and in parallel with the limits proposed for Sizewell C.
 - This is a conservative assumption, as Sizewell B is planned to be shutdown, defueled and decommissioned during the lifetime of Sizewell C.
 - This assumes that discharges do not increase above current permitted levels during the decommissioning of Sizewell B, any increases are likely to be time constrained, and would be subject to regulatory review and approval.
 - It is assumed that, based on the published lifetime plan (Ref. 1.40), Sizewell A has entered care and maintenance and that there are not any discharges from Sizewell A during the commissioning and operation of Sizewell C.

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VOLUME 1, CHAPTER 6, APPENDIX 6V: CLIMATE CHANGE LEGISLATION AND METHODOLOGY

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None provided.

1. Climate Change Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant Climate Change effects of the Sizewell C Project. This appendix applies to all Sizewell C Project sites, unless otherwise indicated, i.e. **Volumes 2 to 9** of the Environmental Statement (**ES**).

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Volume 2, Chapter 26** of the **ES**.

1.1.3 Climate change assessment comprises three components:

- Lifecycle greenhouse gas (GHG) emissions – the impact of GHG emissions arising from the Sizewell C Project on the climate, including how the Sizewell C Project will affect the ability of the Government to meet its carbon reduction plan targets.
- Climate Change Resilience (CCR) – the resilience of the Sizewell C Project to Climate Change impacts, including how the Sizewell C Project's design will take into account the projected impacts of Climate Change.
- In-combination climate impacts (ICCI) – combined impact of the Sizewell C Project and potential Climate Change on the sensitive receptors in the surrounding environment.

1.1.4 The GHG impact assessment has inter-dependencies with the following technical assessments within the **ES**:

- Air quality, **Chapter 12** of **Volume 2** and **Chapter 5** of **Volumes 3 to 9** of the **ES** – in respect of data relating to transport of materials and workers.
- Transport, **Chapter 10** of **Volume 2** of the **ES** – in respect of traffic data (i.e. mode and distance travelled), relating to the transportation of construction materials, workers and transportation during construction and operation of the Sizewell C Project.
- Conventional waste management, **Chapter 8** of **Volume 2** of the **ES** – in respect of materials required and waste arisings data for site establishment and preparation works, construction, operation and removal of temporary facilities.

- Groundwater and Surface Water, **Chapter 19 of Volume 2** and **Chapter 12 of Volumes 3 to 9** of the **ES** – in respect of data relating to water use during construction and operation.
- Terrestrial Ecology and Ornithology, **Chapter 14, Appendix 14E Biodiversity Net Gain Report of Volume 2** of the **ES** – in respect of data relating to land use changes during construction and operation.

1.1.5 The CCR and ICCI assessments have inter-dependencies with the following technical assessments within the **ES**:

- Flood risk – in respect of mitigation measures proposed to mitigate against identified Climate Change impacts. A detailed assessment of flood risk is presented within the site specific **Flood Risk Assessments (FRAs)** (Doc Ref. 5.2 to 5.9). A summary of the findings of the site specific **FRAs** (Doc Ref. 5.2 to 5.9) is provided within Groundwater and Surface Water, **Chapter 19 of Volume 2** and **Chapter 12 of Volumes 3 to 9** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 This section provides a summary of specific legislation, policy and guidance of relevance to the Climate Change assessment.

1.2.2 Legislation and policy have been taken into account on an international, national, regional and local level. The following are considered to be relevant to the Climate Change assessment as they have influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. Paris Agreement (2016)

1.2.3 The Paris Agreement (Ref 1.1) is an agreement to enhance the United Nations Framework Convention on Climate Change. Its purpose aims to strengthen the global response to the threat of climate change by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. All parties, including the UK, are to undertake and communicate ambitious efforts with the view to achieving this purpose.

b) National

i. Legislation

Climate Change Act 2008

- 1.2.4 The Climate Change Act 2008 (Ref 1.2) establishes a legally binding target to reduce the UK's GHG emissions. To drive progress and set the UK on a pathway towards this target, the Act introduced a system of 5-year carbon budgets.

The Climate Change Act 2008 (2050 Target Amendment) Order 2019

- 1.2.5 In June 2019, the Government adopted the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 1.3), an amendment to the Climate Change Act 2008 (Ref 1.2) to revise the previously set target of an 80% reduction of GHG emissions by 2050 compared to 1990 levels to a net zero carbon target.
- 1.2.6 Before the 2019 Order, the Climate Change Act 2008 required that the pathway to achieving the previous 2050 carbon target was set out through a series of Carbon Budget Orders specifying five-year carbon budgets. The most recent carbon budget is the fifth that sets a cap on carbon emission levels between 2028 and 2032.
- 1.2.7 In their latest report (2019) to Parliament on progress against the carbon reduction target established in the Climate Change Act 2008, the Committee on Climate Change (Ref 1.4) stated:
- “The path to achieving net-zero emissions by 2050 will necessarily entail a steeper reduction in emissions over the intervening three decades. As the existing carbon budgets were set on a cost-effective path to achieving an 80% reduction in UK greenhouse gas emissions by 2050, a more ambitious long-term target is likely to require outperformance of the carbon budgets legislated to date. The Committee will revise its assessment of the appropriate path for emissions over the period to 2050 as part of its advice next year (2020) on the sixth carbon budget.”*
- 1.2.8 Achieving the revised net zero carbon target set out in the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (1.3), will require future GHG emissions to fall within the sixth carbon budget ceilings established by Government (i.e. either avoided or offset). However, in the absence of the published sixth carbon budget, the GHG emissions assessment has been undertaken against the fifth carbon budget.

Carbon Budget Order 2011 (4th Carbon Budget, 2023-2027) and Carbon Budget Order 2016 (5th Carbon Budget, 2028 to 2032).

- 1.2.9 The Carbon Budget Orders (Ref 1.5 and Ref 1.6) implement the carbon budgets set out in the Climate Change Act 2008 (Ref 1.2). The 2016 Carbon Budget Order is the most recent order and sets carbon budgets for the period 2028-2032 as shown in **Table 1.1**.
- 1.2.10 The budgets require the UK to continue to reduce emissions in the most cost-effective way, as it progresses towards the 2050 target set within the Climate Change Act 2008 (Ref 1.2).
- 1.2.11 Progress against the carbon budgets is monitored by the Committee on Climate Change. Details of the carbon budgets and the respective reduction target below 1990 levels are presented in **Table 1.1**.
- 1.2.12 Carbon budgets place a restriction on the total amount of GHG's the UK can emit during each five-year budgetary period. Each carbon budget sets a GHG reduction level against 1990 emission levels to support the UK meeting its reduction target by 2050. Five carbon budgets have been published, with the sixth due to be published in 2020.

Table 1.1: Summary of elements of Climate Change assessment

Carbon Budget	Carbon Budget Level	Reduction below 1990 Levels
1 st (2008 – 2012)	3,018MtCO ₂ e	25%
2 nd (2013 – 2017)	2,782MtCO ₂ e	31%
3 rd (2018 – 2022)	2,544MtCO ₂ e	37% by 2020
4 th (2023 – 2027)	1,950MtCO ₂ e	51% by 2025
5 th (2028 – 2032)	1,725MtCO ₂ e	57% by 2030

Environmental Impact Assessment Regulations

- 1.2.13 As detailed in **Volume 1, Chapter 3** of the **ES**, for the purposes of the Environmental Impact Assessment (EIA), the following EIA Regulations are of key relevance, as they transpose the requirements of the EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (Ref 1.7) as amended by Directive 2014/52/EU (Ref 1.8) ('the EIA Directive') into the UK legislation:
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 1.9); and

- The Marine Works (Environmental Impact Assessment) Regulations 2007 (Ref 1.10).

1.2.14 These sets of regulations have been referred to as the Infrastructure Planning EIA Regulations, Marine Works EIA Regulations or the EIA Regulations collectively hereafter.

ii. Policy

National Policy Statements

National Policy Statement for Energy and National Policy Statement for Nuclear Power Generation

1.2.15 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref 1.11) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref 1.12). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

1.2.16 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts.

1.2.17 **Table 1.2** identifies the topic and site specific study or assessment requirements in EN-1 and EN-6 and briefly explains how these have been addressed within the Climate Change chapter.

Table 1.2: National Policy Statements – EN-1 and EN-6 requirements

Ref.	NPS Topic Requirement	How the Requirement has been Addressed
EN-1	Section 4.8.6 requires applicants to account for Climate Change impacts by using the latest UK Climate Projections.	Section 26.5 and Section 26.6 of Volume 2, Chapter 26 of the ES provide the outputs of a Climate Change risk assessment undertaken using UK Climate Projections 2018 (UKCP18).
EN-1	Section 4.8.7 requires that as a minimum the emissions scenario following the 10%, 50% and 90%	Emissions scenarios for 10%, 50% and 90% have been applied. See Sections 26.5 and 26.6 , provided in Volume 2, Chapter 26 of the ES for further details

Ref.	NPS Topic Requirement	How the Requirement has been Addressed
	estimated ranges should be applied.	of the methodology used for the assessment of Climate Change risk.
EN-1	Section 4.8.11 requires that identified Climate Change adaption measures should be based on the latest set of UK Climate Projections and consulted on with the Environment Agency, while the assessment should also consider any adverse impacts caused by the adaption measures.	Measures to adapt the Sizewell C Project to the impacts of future Climate Change are set out in Section 26.5 provided in Volume 2, Chapter 26 of the ES , including engagement with the Environment Agency and other key stakeholders.
EN-6	Section 2.10 6 provides guidance on Climate Change adaption and states that: <i>“Applicants should provide the Infrastructure Planning Commission (IPC) with information as to how the development incorporates adaptation measures to take account of the effects of climate change, including: coastal erosion and increased likelihood of storm surge and rising sea levels; effects of higher temperatures; and increased risk of drought, which could lead to a lack of available process water”.</i>	The CCR and ICCI assessments presented in Chapter 26 of Volume 2 of the ES consider the requirements for Climate Change Resilience set out in EN-6.

National Planning Policy Framework 2019

1.2.18 The National Planning Policy Framework 2019 (NPPF) (Ref 1.13) sets out the Government’s planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.19 Chapter 14 of the NPPF describes the importance of effective planning in ensuring significant reductions in GHG emissions and increasing resilience to adverse effects associated with Climate Change. Paragraph 148 states:

“The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.”

1.2.20 In relation to Climate Change Resilience and adaptation, paragraph 150 states:

“New development should be planned for in ways that:

- a) Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which is vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure: and*
- b) Can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards”.*

1.2.21 The requirements of the NPPF on GHG reduction and Climate Change impacts have been considered as part of the lifecycle GHG and CCR assessments presented in **Chapter 26 of Volume 2** of the **ES**.

iii. Strategies

[The National Adaptation Programme and the Third Strategy for Climate Adaption Reporting \(2018\)](#)

1.2.22 This second National Adaptation Programme (Ref 1.14) sets out the Government’s response to the second Climate Change Risk Assessment published in 2017 (Ref 1.15), showing the actions the Government is, and will be, taking to address the risks and opportunities posed by a changing climate. It forms part of the five-yearly cycle of requirements laid down in the Climate Change Act 2008 (Ref 1.2) to drive a dynamic and adaptive approach to building our resilience to Climate Change.

1.2.23 The National Adaptation Programme presents key actions that will be taken over the next five years to strengthen the UK’s resilience to Climate Change. Section 3.2 specifically focusses on Climate Change risk to the energy sector and states in relation to nuclear power:

“For nuclear installations including operating reactors, the Office of Nuclear Regulation’s (ONR) Safety Assessment Principles underpin the regulatory oversight and scrutiny of licensees’ safety submissions throughout the lifecycle of the installation. The submissions must reflect internal and external hazards including the reasonably foreseeable effects of climate change over the lifetime of the facility as well as other factors such as coastal erosion, extreme weather and flooding. This approach is also reflected in joint

guidance ONR has produced with the national Environment Agencies for nuclear new build.”

- 1.2.24 The effects identified in the National Adaptation Programme have been considered as part of the CCR assessment and ICCI assessment presented in **Chapter 26** of **Volume 2** of the **ES**.

[A Green Future: Our 25 Year Plan to Improve the Environment \(2018\)](#)

- 1.2.25 This UK Government policy (Ref 1.15) sets out a range of goals to be achieved, which include reducing risk of harm from environmental hazards such as flooding and drought and mitigating and adapting to Climate Change. The Plan states:

“We will take all possible action to mitigate climate change, while adapting to reduce its impact. We will do this by:

- Continuing to cut greenhouse gas emissions including from land use, land use change, the agriculture and waste sectors and the use of fluorinated gases. The UK Climate Change Act 2008 commits us to reducing total greenhouse gas emissions by at least 80 per cent by 2050 when compared to 1990 levels;*
- Making sure that all policies, programmes and investment decisions take into account the possible extent of climate change this century; and*
- Implementing a sustainable and effective second National Adaptation Programme.”*

[Biodiversity 2020: A strategy for England’s wildlife and ecosystem services \(2011\)](#)

- 1.2.26 Biodiversity 2020: A strategy for England’s wildlife and ecosystem services (2011) (Ref 1.17) establishes the principles for considering biodiversity and the effects of Climate Change. The EIA reflects these principles and identifies how the Sizewell C Project’s effects on the natural environment will be influenced by Climate Change, and how ecological networks will be maintained as presented in **Chapter 26** of **Volume 2** of the **ES**.

c) Regional

i. Policy

East Inshore and East Offshore Marine Plans

1.2.27 The East Inshore and East Offshore Marine Plans (Ref 1.18) are the first two marine plans to be produced for English seas:

- The East Inshore Marine Plan area includes the coastline stretching from Flamborough Head to Felixstowe, extending from mean high water out to 12 nautical miles, including inland areas such as the Broads and other waters subject to tidal influence, and covers an area of 6,000 square kilometres.
- The East Offshore Marine Plan area covers the marine area from 12 nautical miles out to the maritime borders with the Netherlands, Belgium and France, a total of approximately 49,000 square kilometres of sea.

1.2.28 The plans sets a number of objectives informed by the vision for East Marine Plan Areas in 2034:

“By 2034 sustainable, effective and efficient use of the East Inshore and East Offshore Marine Plan Areas has been achieved, leading to economic development while protecting and enhancing the marine and coastal environment, offering local communities new jobs, improved health and well-being. As a result of an integrated approach that respects other sectors and interests, the East marine plan areas are providing a significant contribution, particularly through offshore wind, to the energy generated in the United Kingdom and to targets on climate change”.

1.2.29 Of the 11 objectives set-out within the plans; the following is most relevant to Climate Change:

- **Objective 9: To facilitate action on Climate Change adaptation and mitigation in the East marine plan areas.** This objective relates to the need to combat climate change by reducing greenhouse gas emissions (mitigation), to address the unavoidable consequences of a changing climate and by reducing related risks faced by the marine-based sectors (adaptation).

Suffolk Climate Action Plan (2017)

1.2.30 The Suffolk Climate Change Partnership, consisting of Suffolk’s local authorities and the Environment Agency, work together with several

organisations including Groundwork Suffolk and the University of Suffolk under a shared interest in supporting Suffolk's communities, businesses and residents to reduce carbon emissions, realise the economic benefits of reducing energy consumption and adapt to the future impacts of Climate Change. In March 2017, the Suffolk Climate Change Partnership published Suffolk Climate Action Plan 3 (Ref 1.19), replacing the second plan published in July 2012.

- 1.2.31 The plan explains that in line with the Climate Change Act 2008 (Ref 1.2), the Suffolk Climate Change Partnership has set its own target: (Ref 1.19):

“To facilitate a reduction in absolute carbon emissions in Suffolk of 35% on 2010 levels by 2025 and 75% by 2050, in line with the UK Climate Change Act 2008”.

- 1.2.32 This plan identifies the key challenges for Suffolk, which include:

- Increased flood risk.
- Water scarcity.
- Health during increasingly frequent extreme weather events.
- Ability of Suffolk's infrastructure to cope with changing demand and use.
- Organisational resilience to Climate Change.
- Changes to natural systems.

- 1.2.33 Suffolk County Council commits to support businesses to improve their profitability through reducing energy use and carbon emissions since 2008.

- 1.2.34 The potential effects of the Sizewell C Project regarding the key challenges identified in the plan has been considered as part of the ICCI assessment presented in **Chapter 26 of Volume 2 of the ES**.

d) **Local**

- 1.2.35 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

- 1.2.36 Accordingly, there are two parts to ESC's Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.
- 1.2.37 The adopted Suffolk Coastal Local Plan (Ref 1.19) comprises the 'saved policies' of the:
- Suffolk Coastal Local Plan (incorporating 1st and 2nd Alterations) (2001 and 2006) (Ref 1.20); and the
 - Core Strategy and Development Management Policies (2013) (Ref 1.21).
- 1.2.38 Climate Change impact is a key priority within this Core Strategy, in accordance with national and global priorities. This includes addressing impacts generated by new development, as well as enabling communities to mitigate and adapt to the impacts of Climate Change, particularly sea level rise due to the low-lying coastal areas of the district. Further key impacts of Climate Change identified within this Core Strategy include falling land levels, flooding of numerous inland rivers and estuaries, increased storminess and drought (being situated within East Anglia, the Suffolk Coastal area is already part of one of the driest areas of the country).
- 1.2.39 Climate Change mitigation measures highlighted within this Core Strategy include ensuring development minimises the use of natural resources by utilising recycled materials where appropriate, minimises greenhouse gas emissions, incorporates energy efficiency, encourages the use of public transport, and helps to reduce waste.
- i. [Site Allocations and Area Specific Policies Development Plan Document \(2017\)](#)
- 1.2.40 This Site Allocations and Area Specific Policies Development Plan Document (Ref 1.22) assists in implementing the objectives, policies and proposals in the Core Strategy (Ref 1.21) through settlement specific land use policies and the identification of sites for new development.
- 1.2.41 This document covers the majority of the District excluding the Felixstowe Peninsula and a number of parishes where neighbourhood plans are being prepared. It identifies sites for different types of development such as housing and employment, defines the boundaries of built up areas and other policy areas such as town centres and areas to be protected from development, and identifies local infrastructure requirements.

ii. Suffolk Coastal Local Plan (January 2019)

1.2.42 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) (Ref 1.23) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

1.2.43 This Local Plan highlights the importance of mitigating and adapting to the impacts of Climate Change. Key priorities for Climate Change mitigation and adaptation include:

- Increasing renewable energy production.
- Making sure appropriate response to sea level rise and coastal erosion.
- Making sure sustainable construction techniques and green infrastructure is employed to mitigate Climate Change.
- Careful consideration of low-lying areas at risk of flooding (including flash flooding, estuarine flooding and coastal flooding).
- Reducing waste.

1.2.44 The Local Plan also states proposals should improve the efficiency of heating, cooling and lighting of buildings by maximising daylight and passive solar gain through the orientation of buildings. Also, for all non-residential development, the Council will expect compliance with Building Research Establishment Environmental Assessment Method standards.

e) Guidance

1.2.45 This assessment has been undertaken in accordance with the following guidance documents:

i. National Planning Practice Guidance (2019)

1.2.46 The NPPF is supported by National Planning Practice Guidance, which includes the Climate Change Planning Practice Guidance (PPG) (Ref 1.24).

1.2.47 This guidance advises how to identify suitable mitigation and adaptation measures in the planning process and has been considered within the design of the Sizewell C Project to address the impacts of Climate Change.

1.2.48 Necessary mitigation and adaption measures has been identified as part of the CCR process. These mitigation and adaption measures are detailed in **Chapter 26 of Volume 2 of the ES.**

- ii. [The Greenhouse Gas Protocol, a Corporate Accounting and Reporting Standard, World Resource Institute & World Business Council for Sustainable Development \(2004\)](#)
- 1.2.49 The GHG Protocol (Ref 1.25) provides standards and guidance for companies and other types of organisations in preparing a GHG inventory.
- iii. [The European Commission \(EC\) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment \(2013\)](#)
- 1.2.50 The European Commission (EC) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013) (Ref 1.26) aims to help European Union (EU) Member States improve how Climate Change and biodiversity are integrated in EIAs carried out across the EU.
- iv. [Institute of Environmental Management and Assessment Principles Series: Climate Change Mitigation & EIA \(2010\)](#)
- 1.2.51 The Institute of Environmental Management and Assessment (IEMA) Principles Series: Climate Change Mitigation & EIA (2010) (Ref 1.27) sets out the overarching principles relating to the consideration of Climate Change mitigation in EIA.
- v. [IEMA The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance \(2017\)](#)
- 1.2.52 IEMA's The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017) (Ref 1.28) provides guidance to assist EIA practitioners to take an informed approach to the treatment of GHG emissions within an EIA. It sets out areas for consideration at all stages of the assessment and offers options that can be explored. It highlights some of the challenges to the assessment such as establishing study boundaries and what constitutes significance.
- vi. [IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation \(2015\)](#)
- 1.2.53 IEMA's Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2015) (Ref 1.29) provides guidance to enable EIA practitioners to include effective consideration of both Climate Change resilience and adaptation in the EIA process.

- vii. [BS EN 15804:2012+A2:2019 Sustainability of Construction Works. Environmental Product Declarations. Core rules for the product category of construction products](#)

1.2.54 BS EN 15804:2012+A2:2019 (Ref 1.30) gives guidance around core product category rules relating to Environmental Product Declarations for construction products and services. It provides a structure to ensure that all Environmental Product Declarations of construction products, construction services and construction processes are derived, verified and presented in a harmonised way.

- viii. [BS EN 15978:2011 Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method](#)

1.2.55 BS EN 15978:2011 (Ref 1.31) focusses on the calculation method to assess the environmental performance of a new or existing building; based on life cycle assessment. It provides a description of the objective of assessment, boundaries applicable at the building level, procedures for inventory analysis, a list of indicators and procedure for calculation, reporting and data requirements.

- ix. [PAS 2080:2016 Carbon Management in Infrastructure](#)

1.2.56 PAS 2080:2016 Carbon Management in Infrastructure (Ref 1.32) provides a common framework for all infrastructure sectors and value chain members on how to manage whole life carbon when delivering infrastructure assets and programmes of work. It promotes reduced carbon, reduced cost infrastructure delivery, more collaborative ways of working and a culture of challenge in the value change to foster innovation. It includes requirements for all value chain members to show the right leadership and to establish effective governance systems for reducing whole life carbon using a detailed carbon management process.

- f) [Data sets](#)

- i. [UK Government GHG Emission Factors \(2019\)](#)

1.2.57 The Department of Business, Energy and Industrial Strategy (BEIS) annually publish the UK Government 'GHG Conversion Factors for Company Reporting'. The UK Government GHG Emission Factors (2019) (Ref 1.33) have been used in the quantification of GHG emissions to convert the activity data into emissions.

ii. The Inventory of Carbon & Energy Database (2019)

- 1.2.58 The Inventory of Carbon & Energy (ICE) database (Ref 1.34) has been used to source appropriate carbon factors to estimate the embodied carbon of materials used for construction of the Sizewell C Project.

iii. United Kingdom Climate Projections 2018

- 1.2.59 The climate resilience review uses the observed climate data and Climate Change projections from the United Kingdom Climate Projections 2018 (UKCP18) (Ref 1.35) to consider future potential impacts on the Sizewell C Project.

1.3 Scope of the assessment

- 1.3.1 The generic EIA methodology is described in **Volume 1, Chapter 6** of the **ES**.
- 1.3.2 The scope of the assessment considers the impacts of the construction and operation of the main development site and associated development site and the removal and reinstatement of temporary development.
- 1.3.3 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, provided in **Volume 1, Appendix 6A** of the **ES**.
- 1.3.4 As the requirement for “*the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change*” to be assessed within the EIA process was introduced by the 2017 EIA Regulations, a Climate Change assessment methodology was only provided within the 2019 EIA Scoping Report, provided in **Appendix 6A** of this volume.
- 1.3.5 Comments raised in the EIA scoping opinions received in 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendix 6C** of this volume.

1.4 Lifecycle Greenhouse Gas impact assessment

a) Study area

- 1.4.1 The GHG impact assessment includes emissions associated with the following:

- All direct GHG emission arising from the construction and operation of the Sizewell C Project.
- Removal and reinstatement of the temporary associated developments once construction of the Sizewell C Project is completed.
- Indirect emissions embedded within construction materials arising from the energy used in their production.
- Emissions arising from the transportation of materials, waste and construction and operational workers.
- Emissions associated with fuel used by the back-up generators in the event of power outages and for any annual testing.

1.4.2 A high-level assessment of the decommissioning of Sizewell C is provided in **Volume 1, Chapter 5** of the **ES**, and includes a consideration of potential GHG emissions.

1.4.3 The environmental impact associated with GHG emissions is both a national and global issue. Consequently, the potential significance of the Sizewell C Project's lifecycle GHG emissions are assessed by comparing the estimated GHG emissions from the Sizewell C Project against the reduction targets defined in the Climate Change Act 2008 (Ref 1.2) and associated five-year, legally binding carbon budgets.

b) [Assessment scenarios](#)

1.4.4 The whole lifecycle of the Sizewell C Project is assessed, including construction, operation and removal and reinstatement of temporary development. It assumes an operational lifetime for the Sizewell C power station of 60 years.

1.4.5 For the construction phase, the GHG impact assessment takes into account the emissions associated with the embodied carbon in materials from their production; land-use change; construction processes (i.e. the use of plant and machinery); worker accommodation campus and caravan site, welfare and site compounds; as well as emissions associated with the transport of materials (to site), waste (from site) and workers (to and from site).

1.4.6 For the operation phase, the GHG impact assessment takes into account nuclear and non-nuclear fuel used for the operation of the main development site; transportation of workers to the site; and disposal and transportation of non-nuclear and nuclear waste.

- 1.4.7 The GHG impact of the Sizewell C Project is compared against a scenario (baseline) in which the Sizewell C Project is not built.

c) **Assessment criteria**

- 1.4.8 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any receptors. Assessments broadly consider the magnitude of impacts and value/ sensitivity of resources/ receptors that could be affected in order to classify effects.

- 1.4.9 A summary of the assessment criteria used in the Climate Change assessment is presented in the following sub-sections.

i. **Sensitivity**

- 1.4.10 The global climate has been identified as the receptor for the purposes of the GHG emissions assessment. However, to enable the evaluation of significance of the estimated GHG emissions arising from the Sizewell C Project, the UK GHG inventory and the corresponding 5-year UK carbon budget were used as a proxy for the global climate.

- 1.4.11 There is no published standard definition for receptor sensitivity of GHG emissions set out in the IEMA guidance (Ref 1.28) or elsewhere. However, in this guidance IEMA does recommend comparing a projects carbon footprint against available carbon budgets, i.e. national, sectoral, etc. Therefore, the sensitivity of the receptor, the UK carbon budget (as a proxy for the global climate), has been defined as high. The rationale for this approach is as follows:

- Any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore the ability to meet its future carbon budgets.
- The commitment to limiting global warming to below 2°C this century, as broadly asserted by the International Paris Agreement (Ref 1.1) and the climate science community.

ii. **Magnitude**

- 1.4.12 In the absence of any defined industry guidance for assessing the magnitude of GHG impacts for EIA, IEMA recommend the use of professional judgement (Ref 1.28). As such, standard GHG accounting and reporting principles have been followed to assess impact magnitude. In GHG accounting, it is common

practice to consider exclusion of emission sources that are <1% of a given emissions inventory on the basis of a *de minimis* contribution.

1.4.13 Both Department of Energy and Climate Change, now the Department for Business, Energy and Industrial Strategy (BEIS) (Ref 1.33), and Carbon Trust (Ref 1.36) allow emissions sources of <1% contribution to be excluded from emission inventories on the basis that an emissions source contribution of <1% would not be material to the overall impact. A development with emissions of <1% of the UK inventory and relevant five-year carbon budget would therefore be minimal in its contribution to the wider national GHG emissions.

1.4.14 The associated magnitude criteria are outlined in **Table 1.3**.

Table 1.3: GHG impact assessment – magnitude criteria

Magnitude	Magnitude Criteria
High	GHG emissions represent equal to or more than 1% of total emissions from the relevant 5-year national carbon budget in which they arise.
Low	GHG emissions represent less than 1% of total emissions from the relevant 5-year national carbon budget in which they arise.

1.4.15 The UK carbon budgets restrict the amount of GHG emissions the UK can legally emit in a defined five year period (Ref 1.5 and Ref 1.6). In assessing the significance of future GHG emissions from the Sizewell C Project, it is important to consider how GHG emissions could impact the UK's ability to meet its future carbon budgets. The significance criteria therefore references the appropriate budgets periods. The UK is currently in the 3rd carbon budget period, which runs from 2018 to 2022.

1.4.16 It should be noted that as a result of the amended 2050 carbon reduction target to net zero carbon, the Committee on Climate Change announced it will review the current carbon budgets. The results of their findings will be available in 2020 when the 6th carbon budget is published. To achieve the revised 2050 target, the emissions reduction trajectory set out in the budgets through to 2050 will need to steepen. As these budgets are not yet available, the current carbon budgets have been used.

1.4.17 The appropriate UK national carbon budgets spanning the 12-year construction programme, which for the purpose of this assessment is expected to be between 2021 and 2034, are the 3rd, 4th and 5th carbon budgets as detailed in **Table 1.4**.

- 1.4.18 The operational phase of the Sizewell C Project (expected to be fully operational by 2034) has been compared to the appropriate and available carbon budgets within the design life of the Sizewell C Project. To date, the UK has agreed up to the fifth carbon budget period that runs from 2028 to 2032.
- 1.4.19 **Table 1.4** shows the current and future UK carbon budgets up to 2032, highlighting the total amount of GHG the UK can emit legally going into the future.
- 1.4.20 **Table 1.4** also demonstrates the phased contraction of future carbon budgets, which means that any source of emissions contributing to the UK's carbon inventory will have an increasing impact on future UK carbon budgets.

Table 1.4: GHG impact assessment – relevant carbon budgets

Carbon Budget	Total Budget (MtCO ₂ e)
3 rd (2018 – 2022)	2,544
4 th (2023 – 2027)	1,950
5 th (2028 – 2032)	1,725

iii. Effect definitions

- 1.4.21 **Table 1.5** presents the definitions of effect for the GHG impact assessment.

Table 1.5: GHG impact assessment – classification of effects

Magnitude	Significance
Low	Minor adverse.
High	Major adverse.

d) Assessment methodology

- 1.4.22 The GHG impact assessment followed a project lifecycle approach to calculate estimated GHG emissions arising from the construction and operation of the Sizewell C Project and the removal and reinstatement of the temporary associated development. The GHG impact assessment identified GHG 'hotspots' (i.e. emissions sources likely to generate the largest amount of GHG emissions), which enabled the identification of priority areas for mitigation in line with the principles set out in IEMA guidance (Ref 1.28).
- 1.4.23 In line with the World Business Council for Sustainable Development & World Resource Institute GHG Protocol (Ref 1.25), the GHG impact assessment is

reported as tonnes of carbon dioxide equivalent (tCO_{2e}) and includes the seven Kyoto Protocol gases:

- Carbon dioxide (CO₂).
- Methane (CH₄).
- Nitrous oxide (N₂O).
- Sulphur hexafluoride (SF₆).
- Hydrofluorocarbons (HFCs).
- Perfluorocarbons (PFCs).
- Nitrogen Trifluoride (NF₃).

1.4.24 The expected GHG emissions arisings and baseline emissions were estimated using the following equation in alignment with the GHG Protocol (Ref 1.25):

$$\text{Activity data} \times \text{GHG emissions factor} = \text{GHG emissions}$$

1.4.25 BEIS 2019 emissions factors (Ref. 1.33) and embedded carbon emissions factors from the ICE (Ref 1.34) were used to calculate GHG emissions.

1.4.26 To identify the impact or benefits of the Sizewell C Project on the climate, GHG emissions from the Sizewell C Project have been compared against the assessment scenarios described above. Emissions from construction activities and embodied carbon in materials used for the Sizewell C Project have been considered additional i.e. will not occur if the Sizewell C Project is not consented. GHG emissions from the operation of the Sizewell C Project have been put into the context of grid-wide energy production by comparing emissions per kWh of electricity generated by the Sizewell C Project against other grid electricity generation sources that may be used if the Sizewell C Project is not consented.

e) Baseline methodology

1.4.27 This section describes the baseline environmental characteristics for the Sizewell C Project and surrounding areas, with specific reference to GHG emissions.

i. Current baseline

- 1.4.28 The current baseline for the GHG emissions assessment is based on 2018, the latest year for which GHG data is available. The baseline comprises existing sources of GHG emissions arising from activities within the study area boundary as well as the impact of any existing carbon stock i.e. carbon that has been sequestered from the atmosphere that is stored in existing biomass on the site.

ii. Future baseline

- 1.4.29 The future baseline for the GHG impact assessment is a ‘do nothing’ scenario that takes into account GHG emissions from other sources of grid electricity generation including fossil fuels and renewable energy that may be used assuming the Sizewell C Project is not consented.

f) Assumptions and limitations

- 1.4.30 The GHG impact assessment has been based on information in respect of energy use, types and quantities of materials used and waste generated that is available during the design process. Where information is not available, assumptions based on professional judgement have been made. These assumptions are consistent with those made by other topics for their assessment presented in the **ES**.
- 1.4.31 GHG emissions from the decommissioning stage of the Sizewell C Project and permanent off-site associated development sites (excluding park and rides) have been scoped out of the assessment due to the anticipated operational length of the Sizewell C Project. The replacement of elements of the Sizewell C Project have been included as part of the maintenance life cycle stage of the GHG impact assessment.

1.5 Climate change resilience assessment

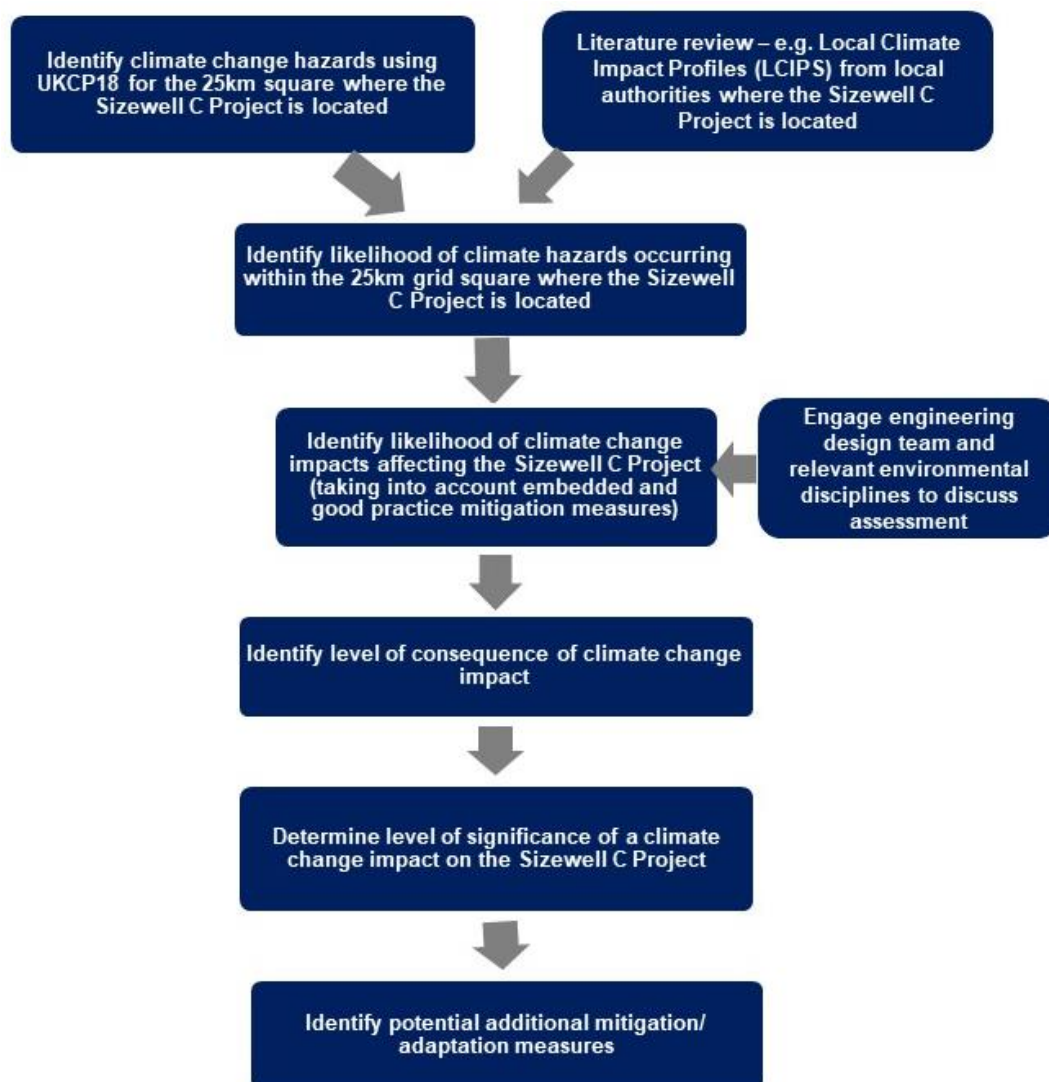
- 1.5.1 This section outlines the methodology for assessing the likely significant effects of Climate Change on the construction and operation of the Sizewell C Project.
- 1.5.2 The CCR assessment has considered the strategic aims and objectives encompassed within the Government’s planning strategy and policy, which has the overarching aim of minimising the adverse impacts of Climate Change, whilst requiring new development to take Climate Change considerations into account within design. Ways in which resilience of the Sizewell C Project to Climate Change can be enhanced have been assessed and mitigation measures have been identified.

- 1.5.3 The assessment has included all infrastructure and assets associated with the Sizewell C Project. It has assessed resilience against both gradual Climate Change and the risks associated with an increased frequency of severe weather events as per the UKCP18 Climate Change projections (Ref 1.35).
- 1.5.4 For the operational phase of the Sizewell C Project, once potential impacts have been identified, the likelihood and consequence of each impact occurring to each receptor (where relevant) has been assessed, for the selected future time frame for operation (2090s).
- 1.5.5 Project lifetime is considered to include the construction stage of 12 years and operational stage of 60 years. With respect to the construction phase, given its duration is much shorter than the operational phase of the Sizewell C Project, future Climate Change is less relevant, and the assessment of potential impacts follows a more descriptive approach.
- a) [Study area](#)
- 1.5.6 The study area for the CCR assessment comprises any physical assets and associated activities for the construction and operation of the Sizewell C Project.
- b) [Assessment scenarios](#)
- 1.5.7 The CCR assessment scenario considers Climate Change impacts during the construction and operation of Sizewell C on the main development site and the associated developments through to 2099, the last year for which UKCP18 climate projections (Ref 1.35) are provided. The scenario took into account the resilience of construction and operation of the Sizewell C Project to Climate Change, resulting from projected increases in temperature, high winds, flooding (associated with increases in precipitation and sea level change).
- c) [Assessment criteria](#)
- 1.5.8 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether Climate Change will have an impact on the Sizewell C Project. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects. A summary of the criteria used in this assessment is presented in the assessment approach sub-sections below.

d) Assessment approach

- 1.5.9 The EIA Regulations require an ES to include a statement describing how a proposed development will be designed to reduce its vulnerability to future Climate Change.
- 1.5.10 Consideration of Climate Change impacts within EIAs is an area of emerging practice. The approach outlined below is aligned with existing guidance such as that of IEMA (Ref 1.29).
- 1.5.11 An assessment of CCR has been conducted for the Sizewell C Project that identifies potential Climate Change impacts and considers their potential consequence and likelihood of occurrence.
- 1.5.12 The following key terms and definitions relating to the CCR assessment are used:
- Climate hazard – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation.
 - Climate Change impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose.
 - Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.
- 1.5.13 The methodology for the CCR assessment is summarised in **Plate 1.1**, with each step of the methodology then discussed in turn.

Plate 1.1: CCR assessment methodology



i. Identify the Climate Change hazard

1.5.14 Existing literature providing observations on Climate Change such as the UK Climate Change Risk Assessment (Ref 1.15) along with UKCP18 (Ref 1.35) data outputs for the location of the Sizewell C Project have been used to identify potential climate hazards that may affect the geographical location of the Sizewell C Project.

ii. Identify the likelihood of the Climate Change hazard occurring

1.5.15 Once Climate Change hazards have been identified the likelihood of the Climate Change hazard occurring is then assessed. This is defined as the

probability of a given well-defined outcome occurring in the future. Likelihood is categorised into five levels depending on the probability of the hazard occurring, in line with the definitions of likelihood in the Intergovernmental Panel on Climate Change Fifth Assessment Report (Ref 1.37), which are shown in **Table 1.6**.

Table 1.6: CCR assessment – likelihood of climate hazard occurring

Level of Likelihood	Definition of Likelihood
Very likely.	90-100% probability that the hazard will occur.
Likely	66-90% probability that the hazard will occur.
Possible, about as likely as not.	33-66% probability that the hazard will occur.
Unlikely	0-33% probability that the hazard will occur.
Very unlikely.	0-10% probability that the hazard will occur.

iii. Identify the likelihood of the Climate Change impact affecting the Sizewell C Project

- 1.5.16** The likelihood of a climate impact occurring has been assessed based on the likelihood of the hazard occurring combined with the vulnerability of the Sizewell C Project, using professional judgement and in discussion with the design team. Embedded mitigation measures are taken into account and a likelihood rating has been assigned as described in **Table 1.7**.

Table 1.7: CCR assessment – likelihood of climate impact occurring

Level of Likelihood of Climate Impact Occurring	Definition of Likelihood
Likely	66-100% probability that the impact will occur during the life of the Sizewell C Project.
Possible, about as likely as not.	33-66% probability that the impact will occur during the life of the Sizewell C Project.
Unlikely	0-33% probability that the impact will occur during the life of the Sizewell C Project.

iv. Engage design team and relevant environmental disciplines

- 1.5.17** A requirement of the Nuclear Site Licensing (NSL) process is a need to demonstrate that a site can be developed and operated safely, accounting for external hazards, for example, the risk of flooding due to increases in sea level due to Climate Change.

- 1.5.18 To address this requirement, relevant environmental disciplines and the engineering design team have been engaged to discuss the CCR assessment and identify mitigation measures for incorporation into the design of the Sizewell C Project.
- 1.5.19 While there are no specific significance criteria for CCR assessment, a framework has been developed to identify and prioritise risks according to perceived level of likelihood and severity of operational/ economic disruption.
- 1.5.20 Measures to adapt the Sizewell C Project are identified where climate effects are identified as being significant and reported in the **ES**.

v. Identify the consequence of the Climate Change impact

- 1.5.21 Criteria for assessing the consequence of the impact of the Climate Change impact are defined in **Table 1.8**.

Table 1.8: CCR assessment – consequence assessment

Consequence	Criteria
Very high	<ul style="list-style-type: none"> Permanent damage to structures/ assets. Complete loss of operation/ service. Complete/ partial renewal of infrastructure. Serious health effects, possible loss of life. Extreme financial impact. Exceptional environmental damage.
High	<ul style="list-style-type: none"> Extensive infrastructure damage and complete loss of service. Some infrastructure renewal. Major health impacts. Major financial loss. Considerable environmental impacts.
Medium	<ul style="list-style-type: none"> Partial infrastructure damage and some loss of service. Moderate financial impact. Adverse effects on health. Adverse impact on the environment.
Low	<ul style="list-style-type: none"> Localised infrastructure disruption and minor loss of service. No permanent damage, minor restoration work required. Small financial losses and/or slight adverse health or environmental effects.

Consequence	Criteria
Very low	<ul style="list-style-type: none"> No damage to infrastructure. No impacts on health or the environment. No adverse financial impact.

vi. Determine the level of significance of the Climate Change impact

1.5.22 While there are no specific significance criteria for the assessment of CCR, a framework has been developed to identify and prioritise risks according to the perceived level of likelihood and severity of operational/ economic disruption.

1.5.23 Significance is derived through combining outcomes from the likelihood of impact with the consequence to determine the level of effect, as shown in **Table 1.9**. As a general rule, where an adverse effect is determined as:

- major or moderate this is deemed significant; or
- minor or negligible this is deemed not significant.

1.5.24 However, professional judgement is also applied where appropriate.

Table 1.9: CCR assessment – classification of effects

		Level of Likelihood of Impact Occurring				
		Very Likely	Likely	Possible, About as Likely as Not	Unlikely	Very Unlikely
Consequence	Very High	Major	Major	Major	Minor	Negligible
	High	Major	Major	Moderate	Minor	Negligible
	Medium	Moderate	Moderate	Moderate	Minor	Negligible
	Low	Minor	Minor	Minor	Minor	Negligible
	Very Low	Negligible	Negligible	Negligible	Negligible	Negligible

e) Baseline methodology

1.5.25 This section describes how the baseline environmental characteristics for the Sizewell C Project have been established, with specific reference to climatic conditions. The baseline includes the existing and future climate conditions.

i. Current baseline

- 1.5.26 Historic climate data obtained from the Met Office website (Ref 1.38) recorded by the meteorological station closest to the Sizewell C Project (Levington Weather Station) for the period 1981 – 2010 has been used to develop a current baseline. A series of climate variable data sets including annual/monthly average temperature and annual/ monthly precipitations data has been collated and analysed.

ii. Future baseline

- 1.5.27 The UKCP18 Projections provide probabilistic Climate Change projections for pre-defined 20-year periods for annual, seasonal and monthly changes to mean climatic conditions over land areas.

- 1.5.28 For the assessment, UKCP18 probabilistic projections for the following average climate variables have been obtained and are analysed:

- Temperature:
 - mean annual.
 - mean summer.
 - mean winter.
 - maximum summer.
 - minimum winter.
- Precipitation:
 - mean annual.
 - mean summer.
 - mean winter.

- 1.5.29 UKCP18 probabilistic projections have been analysed for the 25km grid square where the Sizewell C Project is located. These figures are expressed as anomalies in relation to the 1981-2000 baseline, which allows more specific time periods for the projections used within the assessment opposed to those that would be generated from the 1981-2010 baseline.

- 1.5.30 The assessment has a temporal scope of 72 years, which includes the construction period and the proposed 60 years of operation for the UK European Pressurised Water Reactor (EPR™). This aligns with NPS EN-1, Section 3.5.10 (Ref 1.11) for the estimated operational design life of a nuclear power station. The CCR assessment considers high emissions scenario at

the 10%, 50% and 90% probability levels to assess the impact of Climate Change over the lifetime of the Sizewell C Project.

1.5.31 Further data has been obtained, where available, for other climate variables and extreme weather events, namely:

- Heavy rainfall events.
- Droughts (extended periods of low precipitation).
- Heat waves (high temperatures).
- Frosts/ freezes (low temperatures).
- Average and strong winds.
- Humidity.
- Lightning.
- Fog.

1.5.32 In addition to data projections on climate variables, sea level projection data has also been collated and assessed to understand the impact of future sea level rise, as a result of Climate Change, on the Sizewell C Project.

f) **Assumptions and limitations**

1.5.33 Climate change, by its very nature, is associated with a range of assumptions and limitations. For example, there is uncertainty regarding how global climatic trends will be reflected at the regional scale. To overcome these issues, forecast Climate Change data have been used from UKCP18. This has been coupled with the replication of proven effective approaches undertaken for similar project types.

1.5.34 Assessments made in relation to 'consequence' and 'likelihood' rely on professional judgement and evidence gathered through other environmental topic assessments. All assumptions and limitations, including any exclusions, together with assumptions for choices and criteria leading to exclusion of input and output data have been documented as part of the assessment.

1.6 **In-combination climate impacts assessment**

1.6.1 This section outlines the methodology for assessing the combined impacts of Climate Change and the Sizewell C Project (ICCI) on receptors in the surrounding environment.

a) Study area

- 1.6.2 The study area for the ICCI assessment includes the receptors in the surrounding environment, as defined by each environmental discipline in their technical assessments reported in **Volumes 2 to 9** of the **ES**.

b) Assessment scenarios

- 1.6.3 This ICCI assessment has considered the following scenarios:
- Construction at the main development site (including removal and reinstatement of temporary development).
 - Construction at the associated development sites (including removal and reinstatement of temporary development).
 - Operation of the main development site.
 - Operation of associated developments (considered within the construction assessment).

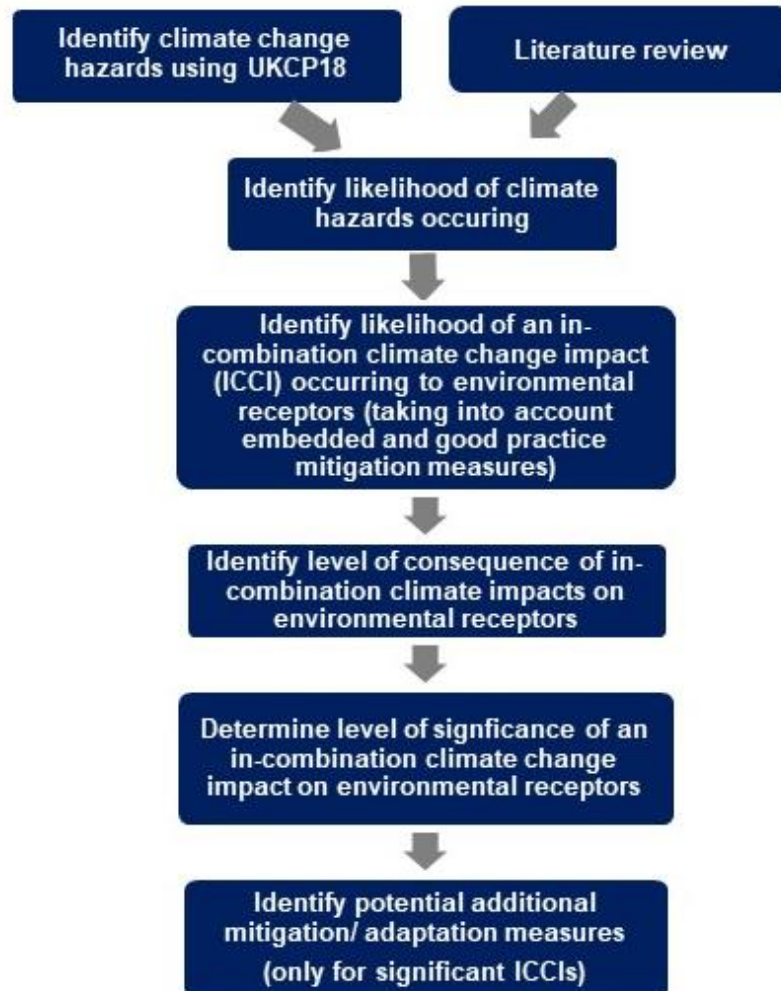
c) Assessment criteria

- 1.6.4 The ICCI assessment methodology considers the combined impact of Climate Change and the Sizewell C Project on receptors identified by other environmental disciplines. Assessments broadly consider the magnitude of impacts and value/ sensitivity of resources/ receptors that could be affected in order to classify effects. A summary of the assessment criteria is provided in sub-sections below.

d) Assessment methodology

- 1.6.5 Consideration of Climate Change impacts within EIAs is an area of emerging practice. The stepped approach outlined in **Plate 1.2** is aligned with existing guidance such as IEMA (Ref 1.29).

Plate 1.2: ICCI assessment methodology.



i. Identify the Climate Change hazard

1.6.6 Information on historic observations on Climate Change such as the UK Climate Change Risk Assessment (Ref 1.15) along with Climate Change projection data from UKCP18 (Ref 1.35) have been used to identify potential climate hazards that may affect the geographical location of the Sizewell C Project.

ii. Identify the likelihood of the Climate Change hazard occurring

1.6.7 The likelihood of each Climate Change hazard occurring has then been assessed. Likelihood is categorised into five levels depending on the probability of the hazard occurring. **Table 1.10** presents the likelihood levels and definitions used. This is in line with the definitions presented in the

Intergovernmental Panel on Climate Change Fifth Assessment Report (Ref 1.37).

Table 1.10: ICCI assessment – likelihood of climate hazard occurring

Level of Likelihood	Definition of Likelihood
Very likely	90-100% probability that the hazard will occur.
Likely	66-90% probability that the hazard will occur.
Possible, about as likely as not.	33-66% probability that the hazard will occur.
Unlikely	0-33% probability that the hazard will occur.
Very unlikely	0-10% probability that the hazard will occur.

1.6.8 There is a certain amount of overlap in the criteria provided to allow for uncertainty and the qualitative approach of the assessment.

iii. Identify the likelihood of the Climate Change impact occurring on a receptor

1.6.9 The likelihood of an in-combination climate impact occurring is determined based on the likelihood of a climate hazard occurring (**Table 1.10**) combined with the sensitivity of the receptor as defined by the relevant environmental disciplines, using professional judgement. Consideration is given to any increase in the impact caused by the Sizewell C Project.

1.6.10 In defining the likelihood of an ICCI occurring, embedded and good practice mitigation measures (primary and tertiary mitigation) are accounted for. Definitions of likelihood are set out in **Table 1.11**.

1.6.11 **Table 1.11** is meant to support ICCI assessment but where it does not fit with discipline specific criteria to assess effects then expert judgement is used to qualitatively assess the likelihood of the impact occurring.

Table 1.11: ICCI assessment – likelihood of climate impact occurring

Level of Likelihood of Climate Impact Occurring	Definition of Likelihood
Likely	66-100% probability that the impact will occur during the life of the Sizewell C Project.
Possible, about as likely as not.	33-66% probability that the impact will occur during the life of the Sizewell C Project.
Unlikely	0-33% probability that the impact will occur during the life of the Sizewell C Project.

1.6.12 **Table 1.12** is then be used to determine the overall likelihood of the ICCI.

Table 1.12: ICCI assessment – likelihood of ICCI occurring

		Likelihood of Climate Change Hazard Occurring				
		Very Unlikely	Unlikely	Possible	Likely	Very Likely
Likelihood of Impact Occurring (Given Embedded Mitigation Measures)	Unlikely	Low	Low	Low	Medium	Medium
	Possible, About as Likely as Not	Low	Low	Medium	Medium	Medium
	Likely	Low	Medium	Medium	High	High

iv. Identify level of consequence of an in-combination Climate Change impact

1.6.13 Once the likelihood of an ICCI occurring on a receptor has been identified, the discrete environmental assessment consider how this will affect the significance of the identified effects.

1.6.14 The ICCI consequence criteria are defined in **Table 1.13** and are based on the change to the significance of the effect already identified by the environmental discipline. To assess the consequence of an ICCI impact, each discipline has assigned a level of consequence to an impact based on the criteria description in **Table 1.13** and their discipline assessment methodology.

Table 1.13: ICCI assessment – consequence criteria

Consequence	Consequence Criteria
High	The Climate Change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/ receptor, as defined by the topic, to increase from moderate to major.
Medium	The Climate Change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/ receptor, as defined by the topic, to increase from low to moderate.
Low	The Climate Change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/ receptor, as defined by the topic, to increase from negligible to low.
Very Low	The Climate Change parameter in-combination with the effect of the proposed scheme does not impact the significance of the impact of the proposed scheme on the resource/ receptor, as defined by the topic.

v. Determine the level of significance of the Climate Change impact

- 1.6.15 The significance of effects is determined by the environmental disciplines using the matrix in **Table 1.14**.

Table 1.14: ICCI assessment – significance criteria

Consequence	Likelihood		
	Low	Medium	High
Very Low	Negligible	Negligible	Minor
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

- 1.6.16 Significance is derived through combining outcomes from the likelihood of impact with the consequence to determine the level of effect, as shown in **Table 1.14**. As a general rule, where an adverse effect is determined as:

- Major or moderate this is deemed significant; or
- Minor or negligible this is deemed not significant.

- 1.6.17 However, professional judgement is also applied where appropriate.

vi. Identify mitigation/ adaptation measures (only for significant ICCIs)

- 1.6.18 Where an ICCI is determined to be significant then appropriate additional mitigation measures (secondary mitigation) is identified.

- 1.6.19 Professional judgement is used to describe whether with additional mitigation in place, the ICCI remains significant or the residual effect has been reduced to not significant.

e) Baseline methodology

- 1.6.20 The baseline for the ICCI assessment is the same as that identified for the CCR assessment. It has been informed using historic climate observations and Climate Change projection data to identify existing and future climate conditions in the geographical location of the site.

f) Assumptions and limitations

- 1.6.21 Climate Change, by its very nature, is associated with a range of assumptions and limitations. For example, there is uncertainty regarding how global climatic trends will be reflected at the regional scale. To overcome

these issues, forecast Climate Change data has been used from UKCP18. This has been coupled with the replication of proven effective approaches undertaken for similar project types.

- 1.6.22 Assessments made in relation to ‘consequence’ and ‘likelihood’ rely on professional judgement and evidence gathered through other environmental disciplines. All assumptions and limitations, including any exclusions, together with assumptions for choices and criteria leading to exclusion of input and output data have been documented as part of the assessment.

1.7 Inter-relationships

- 1.7.1 Inter-relationship effects have been inherently considered within all three components (GHG, CCR and ICCI) of Climate Change assessment. For example, GHG assessment considers emissions due to traffic, waste generation, materials and resource use. The CCR assessment has considered how the Sizewell C Project might be affected due to various climate hazards related to other environmental assessments, such as those associated with the marine environment, flood risk and landscape. The ICCI assessment has considered the inter-relationships between Climate Change and the effects identified by the environmental disciplines as a result of the Sizewell C Project.

References

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VOLUME 1, CHAPTER 6, APPENDIX 6X: MAJOR ACCIDENTS AND DISASTERS LEGISLATION AND METHODOLOGY

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None provided.

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None provided.

1. Major Accidents and Disasters Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant major accidents and disasters (MA&D) risks in the context of the Sizewell C Project.

1.1.2 MA&D assessment is a new EIA topic that requires the assessment of expected significant effects arising from the ‘vulnerability’ of the Sizewell C Project to MA&D and the potential of the Sizewell C Project to result in new sources of major accidents.

1.1.3 A summary of the key terms used in the MA&D assessment is provided in **Table 1.1** below on the basis of definitions provided in:

- Directive 2012/18/EU (Ref. 1.1); of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances (which amended and subsequently repealed Council Directive 96/82/EC (Ref. 1.2));
- The Control of Major Accidents and Hazards (COMAH) Regulations 2015 (Ref. 1.3), through which Directive 2012/18/EU was transposed into UK law;
- The Civil Contingencies Act 2004 (CCA) (Ref. 1.4); and
- Guidance published by the Health and Safety Executive (HSE) (Ref. 1.5) and United Nations Office for Disaster Risk Reduction (UNIDSR) (Ref.1.6).

Table 1.1: Summary of the key terms used in the MA&D assessment

Term	Definition
Hazard	A hazard is defined as an event which may cause harm. Hazards for the purposes of the MA&D assessment are defined as non-malicious events including natural disasters, industrial accidents and industrial action.
Threat	Threats for the purposes of the MA&D assessment are defined as malicious attacks.
Major accident	A major accident, in the context of this assessment, means an uncontrolled event caused by a man-made activity or asset that

NOT PROTECTIVELY MARKED

Term	Definition
	may result in immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of SZC Co. or its contractors to manage. It should be noted that malicious intent is not accidental, however, the outcome of such incident, e.g. aeroplane crash, may be the same and, therefore, the same mitigation measures may apply to both deliberate and accidental events.
Disaster	A disaster, in the context of this assessment, is a naturally occurring phenomenon such as an extreme weather event (e.g. storm, flood, extreme temperatures) or ground-related hazard event (e.g. subsidence, landslide, earthquake) with the potential to cause an event or situation that leads to immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of SZC Co. or its contractors to manage.
MA&D	Combined, the term major accident and/or disaster (MA&D) captures events triggered both internally and externally to the proposed Sizewell C Project, where the presence of the Sizewell C Project could contribute to serious damage.
Serious damage	Serious damage includes the potential loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor which cannot be restored through minor clean-up and restoration efforts and requires the use of resources beyond those of SZC Co. or its contractors to manage.
Vulnerability	Vulnerability describes the susceptibility of an individual, a community, assets or systems to the impacts of hazards. Within this assessment, the term ‘vulnerability’ is used to describe the ability of the Sizewell C Project to plan, control, resist and recover from a MA&D event in a timely manner.

1.1.4 The methodology set out in this appendix has been used to determine the likely significant MA&D risks of the Sizewell C Project, as described in **Volume 2, Chapter 27**.

1.1.5 The MA&D assessment has considered the findings of a number of the EIA technical assessments presented within **Volumes 2 to 9** of the ES, the relevant risk registers to identify existing hazards and threats relevant to the site and sensitive receptors which may experience adverse effects in the event of a MA&D. Furthermore, the technical assessments have informed the appraisal of the vulnerability of the Sizewell C Project to a specific event. The technical assessments within **Volumes 2 to 9** of the ES considered as part of the baseline review are identified in **section 1.3** of this appendix.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant MA&D risks associated with the Sizewell C Project.

1.2.2 Legislation and policy have been considered on an international¹, national, regional and local level. The following are considered to be relevant to the MA&D assessment, as they have influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation or the scope and/or method of assessment.

a) International

i. Legislation

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('EIA Directive')

1.2.3 The EIA Directive (Ref. 1.7) provides the framework for the environmental assessment of public and private projects. Article 14 of the Directive includes reference to "*a Community approach on the prevention of natural and man-made disasters*", and a requirement for MA&D to be considered as part of the EIA process.

1.2.4 Article 15 of the Directive identifies the requirement for projects to ensure a high level of protection of the environment and establishes the need for precautionary actions to be taken. It also states that "*it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment*".

1.2.5 Article 15 also states that "*In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive*

¹ At the point of submission of this application for development consent, the UK is within the transition period for exiting the European Union and the Euratom Treaty. The majority of requirements under the European and Euratom Directives identified through this ES have been implemented within UK domestic legislation, and as such post the transition period the requirements of these directives will remain in place. In addition, number of statutory instruments have been prepared and laid before Parliament address the UK departure from Euratom.

2012/18/EU of the European Parliament and the Council and Council Directive 2009/71/Euratom, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met”.

- 1.2.6 The EIA Directive is transposed into the UK legislation by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref. 1.8) and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (Ref. 1.9) (referred collectively to as ‘the EIA Regulations’), as summarised in a national context below.

[Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances \(‘Seveso III Directive’\)](#)

- 1.2.7 Seveso III Directive (Ref. 1.10) implements rules for the prevention of major accidents which might result from certain industrial activities and for the limitation of their consequences for human health and the environment. The requirements of the Seveso III Directive are transposed into the UK legislation by the Control of Major Accidents and Hazards (COMAH) Regulations 2015 (Ref. 1.3), as summarised in a national context below.

[Council Directive 2009/71/Euratom ‘Nuclear Safety Directive’](#)

- 1.2.8 The Nuclear Safety Directive (Ref. 1.11) establishes a framework for the Euratom Community to maintain and promote the continuous improvement of nuclear safety and its regulation, and requires Member States to provide appropriate national arrangements for the management of risks from nuclear installations. In the UK, the provisions of the Nuclear Safety Directive are transposed by the current nuclear safety regime, mostly through the Nuclear Installations Act 1965 (as amended) (Ref. 1.12) and the standard set of 36 licence conditions attached to Nuclear Site Licences. The nuclear safety regime is regulated by the Office for Nuclear Regulation (ONR).

[International Carriage of Dangerous Goods by Road and the Regulations concerning the International Carriage of Dangerous Goods by Rail](#)

- 1.2.9 The International Carriage of Dangerous Goods by Road (Ref. 1.13) and International Carriage of Dangerous Goods by Rail (Ref. 1.14) set out requirements for the packing, consignment, carriage, loading, unloading, handling, condition of vehicles and requirements for vehicle crews, equipment, operation and documentation. These requirements are implemented into the EU law by Directive 2008/68/EC of the European

Parliament and of the Council of 24th September 2008 on the inland transport of dangerous goods (the ‘Dangerous Goods Directive’) (Ref. 1.15). The Dangerous Goods Directive is subsequently implemented into the UK law by the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (Ref. 1.16), as summarised in a national context below.

Radiological Protection

- 1.2.10 Recommendations on the approach to be taken to protect people from the effects of radiation exposure are made by the International Commission on Radiological Protection (ICRP) (Ref. 1.17) and reviewed periodically. ICRP recommendations form the basis of the worldwide framework for radiation protection standards, provided by the International Atomic Energy Agency Basic Safety Standards (BSS). The International Atomic Energy Agency BSS are then incorporated into the Euratom Basic Safety Standards Directive (Ref. 1.18) and ultimately transposed into the UK legislation by the Radiation (Emergency Preparedness and Public Information) Regulations 2019 (Ref. 1.19), as summarised in a national context below.
- 1.2.11 The UK is a signatory to a number of international agreements, including the Euratom Treaty (Ref. 1.20), the OSPAR (Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic) (Ref. 1.21) and the Espoo (EIA) Convention (Ref. 1.22) which set requirements for the assessment of radiological effects and consultation undertaken with EU member states. Transboundary effects are further considered in **Volume 10, Chapter 5** of the ES. Articles 35, 36 and 38 of the Euratom Treaty require the monitoring of the environment for levels of radioactivity and collaboration and communication of such information between member states. This includes in the event of an emergency.

Maritime Safety

- 1.2.12 The International Maritime Organisation (IMO) is a specialised agency of the United Nations (UN) which is responsible for measures to improve the safety and security of international shipping and to prevent pollution from ships. The UK is a signatory of IMO conventions, the most important of which include the International Convention for the Safety of Life at Sea (SOLAS), 1974 (as amended) (Ref. 1.23) and the International Convention for the Prevention of Pollution from Ships, 1973 (as amended) (MARPOL) (Ref. 1.24).

a) National

i. Legislation

- 1.2.13 The EIA Regulations (Ref. 1.8 and 1.9) establish the requirement to assess MA&D as part of the EIA process (schedule 4, paragraph 8 of Infrastructure Planning EIA regulations and schedule 3, paragraph 9 of the Marine Works EIA regulations)²:

“description of the expected significant adverse effects of the development [project and regulated activity] on the environment deriving from the vulnerability of the development [project and regulated activity] to risks of major accidents and/or disasters which are relevant to the project [and regulated activity] concerned... Where appropriate, this description should [must] include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.”

- 1.2.14 This assessment has been prepared in accordance with the requirements of the EIA Regulations. Further detail on these are provided within Chapters 1 and 3 of Volume 1 of the ES.
- 1.2.15 Whilst the Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005 (Ref. 1.25) does not make any reference to EIA, it is noted that the Act and regulations establish a statutory framework of roles and responsibilities for those involved in emergency preparation and response at the local level. This includes emergency powers that might be necessary to deal with the effects of serious emergencies. The CCA places a duty on the local responders to have an accurate understanding of the risks they face in light of local circumstances and priorities through a risk assessment and emergency planning process. As such, similarities can be drawn from the requirements of the EIA regulations and the CCA in assessing and minimising risk.
- 1.2.16 The design, construction and operation of the Sizewell C Project is required to comply with relevant domestic legislation, the purpose of which is to

² Where wording in the Marine Works EIA Regulations 2007 is different to that included in Infrastructure Planning EIA Regulations 2017, this is quoted in brackets.

reduce the likelihood of a MA&D event occurring or to plan for emergency response. Those of particular importance are summarised below.

Radiological Protection

- Nuclear Installations Act 1965 (as amended) (Ref. 1.12) provides powers to the Office for Nuclear Regulation (ONR) to govern nuclear installations in the UK by the issue of Nuclear Site Licences. The licence covers a standard set of 36 detailed requirements to be addressed by a site licensee covering, for example, management systems, safety cases, plant safety, construction, plant modifications, accumulation/ disposal of radioactive waste and decommissioning. Of particular relevance to this assessment is Licence Condition 11: Emergency Arrangements which aims to ensure a licensee has adequate arrangements in place to be able to respond effectively to any incident in order to ensure the protection of both site personnel and the public so far as is reasonably practicable, thereby ensuring that the licensee, while responding to such an incident, fulfils the general duties imposed upon them by health and safety regulations.
- Nuclear Industries Security Regulations 2003 (Ref. 1.26) establish the requirements for security arrangements and nuclear sites.
- The Ionising Radiations Regulations 2017 (Ref. 1.27) regulate the radiation exposure of workers and the general public. These regulations were made under the Health and Safety at Work etc. Act 1974 (Ref. 1.28), implement the Euratom Basic Safety Directive 2013/59/Euratom (Ref. 1.29), and are consistent with the International Atomic Energy Agency Basic Safety Standards.
- Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPPIR) (Ref. 1.30) set out the requirement to ensure adequate plans are in place in the event of a radiation emergency and information communicated to the public.
- Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended) (Ref. 1.16). This legislation implements the European Agreement concerning the International Carriage of Dangerous Goods by Road and the Regulations concerning the International Carriage of Dangerous Goods by Rail into UK law. It defines the requirements for the safe transportation of radioactive and hazardous materials.

Other Relevant Legislation

- Health and Safety at Work etc. Act 1974 (Ref. 1.28). This legislation places general duties on employers, people in control of premises, manufacturers and employees;
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) (Ref. 1.31). These Regulations under the Health and Safety at Work etc. Act 1974 aim to reduce the risk of injury from lifting equipment used at work and outline control measures to minimise the risk;
- Construction (Design and Management) (CDM) Regulations 2015 (Ref. 1.32). These regulations place specific duties on clients, designers and contractors, so that health and safety is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal;
- The Management of Health and Safety at Work Regulations 1999 (Ref. 1.33). This legislation places health and safety duties on employers and employees, which go beyond those included within the CDM Regulations;
- The Workplace (Health, Safety and Welfare) Regulations 1992 (Ref. 1.34). This legislation covers a wide range of basic health, safety and welfare issues and applies to most workplaces (except those involving construction work on construction sites);
- Personal Protective Equipment (PPE) at Work Regulations 1992 (Ref. 1.355). This seeks to ensure that where risks cannot be controlled by other means PPE should be correctly identified and put into use.
- Dangerous Substances and Explosive Atmospheres Regulations 2002 (Ref. 1.3636) are concerned with protection against risks from fire, explosion and similar events arising from dangerous substances used or present in the workplace.
- Pressure Systems Safety Regulations 2000 (Ref. 1.3737) cover the safe design and use of pressure systems.
- Environmental Permitting Regulations 2016 (as amended) (Ref. 1.38). Under the Environmental Permitting Regulations, the Environment Agency, grants an environmental permit to the operator which prescribes conditions and limitations with which the operator must

comply. This includes the quantities of radioactive waste in solid, gaseous or liquid forms that can be disposed of and the specified disposal routes that can be used. Environmental permits also relate to the control and management of combustion activities and water discharges. Refer to **Volume 1, Chapter 5** for further information.

- Control of Major Accident Hazards (COMAH) Regulations 2015 (Ref. 1.3). This legislation aims to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment. The COMAH Regulations apply to establishments which have dangerous substance(s) specified in an aggregate quantity at or above a qualifying threshold. For those sites to which the COMAH Regulations apply, specific obligations exist to support the management of MA&D (environmental and safety risk);
- Planning (Hazardous Substances) Regulations 2015 (Ref. 1.39). These regulations set out planning procedures in relation to sites where hazardous substances are held and for land near those sites;
- Control of Substances Hazardous to Health Regulations 2002 (COSHH) (Ref. 1.40). COSHH Regulations place requirements on employers to assess and manage health risks associated with hazardous substances, maintain and monitor control measures and plan for emergencies;
- The Regulatory Reform (Fire Safety) Order 2005 (FSO) (Ref. 1.41). This legislation places duties on employers to reduce the risk from fire and ensure safe escape routes in case of fire;
- The Building Regulations 2010 (Ref. 1.42) set out national building standards and requirements for specific aspects of building design and construction, including to control health and safety risks;
- The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (as amended) (Ref. 1.43) ensure that through the duty to develop safe management systems and undertake risk assessments, mechanisms that eliminate or reduce the risk of a major accident occurring are in place; and
- The Railways (Interoperability) Regulations 2011 (as amended) (Ref. 1.44) implement the EU Railway Interoperability Directive 2008/57/EC (Ref. 1.45), which had the purpose of establishing common operational

standards and practices across European railways, including adoption of the Common Safety Method on Risk Evaluation and Assessment (Ref. 1.46). These requirements include safety, reliability and availability, health, environmental protection and technical compatibility along with others specific to certain subsystems.

ii. Policy

National Policy Statements for Energy and Nuclear Power Generation

- 1.2.17 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.47) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.48). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011. As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.
- 1.2.18 The NPSs set out the Government's energy policy; the need for new infrastructure; and guidance for determining an application for a DCO. The NPSs include specific criteria and issues which should be covered by applicants' assessments of the effects of their scheme, and how the decision maker should consider these impacts. As the NPSs were published in 2011, they pre-date the existing EIA Regulations which include the requirement to consider MA&D in EIA and, therefore, no specific provisions for the MA&D assessment are made within the NPSs. Nevertheless, a number of NPS requirements are considered relevant to the MA&D assessment.
- 1.2.19 Section 4.15 of NPS EN-1 (Ref. 1.47) states that the Department of Energy and Climate Change (now Department for Business, Energy and Industrial Strategy) works closely with Government security agencies to reduce the vulnerability of the most 'critical' infrastructure assets in the sector to terrorism and other national security threats. Nuclear security risks should be identified, and measures considered during the design process to manage security risks in consultation with ONR.
- 1.2.20 There are no other requirements relevant to the MA&D assessment provided within NPS EN-1 (Ref. 1.47).
- 1.2.21 Section 2.7 of NPS for Nuclear Power Generation (NPS EN-6) (Ref.1.48) explains the relationship between the regulatory framework for the licensing and permitting of nuclear power stations and the planning regime.

1.2.22 A summary of the relevant NPS EN-6 (Ref. 1.48) requirements, together with consideration of how these requirements have been taken into account, is provided in **Table 1.2**.

Table 1.2: Requirements of the National Policy Statement for Nuclear Power Generation (EN-6)

Ref.	NPS Topic Requirements	How the Requirement has been addressed
2.7.4	<p><i>“Certain matters are for consideration of the Nuclear Regulators³ and the Planning Inspectorate should not duplicate the consideration of these matters itself. Such matters include the Generic Design Assessment (GDA) and the site licensing and environmental permitting processes (including in respect of the management and disposal of radioactive waste, the permitting of cooling water discharges, etc). The Nuclear Regulators are also responsible for those matters listed in paragraph 3.5.3 of this NPS” (see below).</i></p>	<p>MA&D assessment has not duplicated the assessment of safety and security arrangements subject to the Generic Design Assessment, nuclear site licensing and environmental permitting regimes. The MA&D assessment has assumed that these consenting regimes will be properly applied and enforced by the relevant regulator outside of the development consent order process. Therefore, where relevant, the MA&D assessment has assumed compliance with nuclear site licensing and environmental permitting regimes to form part of tertiary mitigation within the ES.</p>
3.5.3	<p><i>“Other Flags for Local Consideration (as set out below) will be considered at the time of the development consent application by the ONR (see Section 2.7 of this NPS):</i></p> <ul style="list-style-type: none"> <i>• demographics;</i> <i>• seismic risk (vibratory ground motion);</i> <i>• capable faulting;</i> <i>• non-seismic ground conditions;</i> <i>• emergency planning (the ONR will work together with the local authority or other Emergency Planning Authority);</i> <i>• meteorological conditions; and</i> 	<p>Where relevant, risks associated with natural disasters related to ground conditions and meteorological conditions, arrangements for emergency planning and the proximity of any existing major accident hazard and threat sources have been considered within the MA&D assessment. However, detailed assessments of these considerations will be subject to the nuclear site licensing regime.</p>

³ The regulators for the nuclear industry are the Environment Agency (EA), the Office for Nuclear Regulation (ONR) and the Department for Transport (DfT)

Ref.	NPS Topic Requirements	How the Requirement has been addressed
	<ul style="list-style-type: none"> • <i>proximity to mining, drilling and other underground operations.</i> 	
3.15.1 and 3.15.2	<p><i>“Significant infrastructure and resources includes:</i></p> <ul style="list-style-type: none"> • <i>motorways, major highways (for example A roads);</i> • <i>strategic rail network;</i> • <i>gas transmission network;</i> • <i>electricity transmission network;</i> • <i>airports;</i> • <i>ports; and</i> • <i>Groundwater Source Protection Zones and Drinking Water Protected Areas.</i> <p><i>Applications should demonstrate that the proposed development would not have an unacceptable adverse impact on significant infrastructure.”</i></p>	<p>MA&D assessment has identified significant infrastructure and resources within the study area of the Sizewell C Project and considered these as receptors within the Environmental Risk Record provided in Volume 2, Appendix 27A.</p>

UK Marine Policy Statement

- 1.2.23** The UK Marine Policy Statement (Ref. 1.49) is a framework for preparing marine plans and taking decisions affecting the marine environment. The UK Marine Policy Statement provides guidance on the potential environmental effects on plans and projects on the marine environment that should be considered during the decision making process. Of particular relevance to the MA&D assessment, the Marine Policy Statement states that environmental impacts that may occur through accidental pollution from ships in the course of navigation or lawful operations, pollution caused by unlawful operational discharges by ships, such as oil, waste or sewage, or physical damage caused by groundings or collisions should be considered as part of the decision making process.

National Planning Policy Framework 2019

- 1.2.24** The National Planning Policy Framework (NPPF) (Ref. 1.50) sets out the Government’s planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act

and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.2.25 Paragraph 45 of the NPPF (Ref. 1.50) states that:

“Local planning authorities should consult the appropriate bodies when considering applications for the siting of, or changes to, major hazard sites, installations or pipelines, or for development around them”.

1.2.26 Paragraph 95 of the NPPF (Ref. 1.50) states that planning decisions “*should promote public safety and take into account wider security and defence requirements by*”, amongst other things: “*anticipating and addressing possible malicious threats and natural hazards, especially in locations where large numbers of people are expected to congregate...This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security.*”

b) Regional

i. East Inshore and Offshore Marine Plan

1.2.27 The East Inshore and Offshore Marine Plan (Ref. 1.51) sets the requirements of the UK Marine Policy Statement into a regional context. Of relevance to the MA&D assessment, the Marine Plan requires for the risk of release of hazardous substances as a secondary effect due to any increased collision risk to be taken account of in proposals that require an authorisation.

c) Local

1.2.28 The Sizewell C Project site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council (WDC). On 1 April 2019, ESC was formally established in place of SCDC and WDC.

1.2.29 Accordingly, there are two parts to ESC’s Local Plan, the Suffolk Coastal Local Plan and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the Suffolk Coastal Local Plan.

1.2.30 The adopted Suffolk Coastal Local Plan comprises the: ‘saved policies’ of the Suffolk Coastal Local Plan (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan

Document (2013); and the Site Allocations and Area Specific Policies Development Plan Document (2017).

1.2.31 In March 2019, SCDC submitted their draft new Suffolk Coastal Local Plan (January 2019) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies 2013

1.2.32 There are no requirements of relevance to the MA&D assessment included within the Suffolk Coastal District Council Local Plan Core Strategy and Development Management Policies (2013) (Ref. 1.52).

ii. Suffolk Coastal District Council Final Draft Local Plan

1.2.33 Table 3.6 of the Suffolk Coastal District Council Final Draft Local Plan (Ref. 1.53) identifies the requirement for a “*co-ordinated Emergency Plan to be established across all organisations*” for major energy infrastructure projects. Information on consultation with emergency services is provided within **Volume 2, Chapter 9 Socio-economics** and the **Consultation Report** (Doc Ref. 5.1).

d) Guidance

1.2.34 Notably, there is no specific guidance available which sets out the approach for undertaking a MA&D assessment within EIA. However, the assessment methodology presented within this document has been developed with due regard to the following guidance documents:

- Chapter 4 of the Cabinet Office’s Emergency Preparedness guidance on part 1 of the CCA (hereafter referred to as the ‘CCA risk assessment framework’) (Ref. 1.54) provides an overview of the risk assessment process as governed by the CCA. Consideration has been given to how the assessment criteria presented within the guidance aligns with the EIA process.
- Chemicals and Downstream Oil Industries Forum (CDOIF) Guidelines, Environmental Risk Tolerability for COMAH Establishments (Ref. 1.55);
- European Commission’s 2017 Guidance on EIA (Ref. 1.56);

- Planning Inspectorate’s Annex G to Advice Note eleven: Working with public bodies in the infrastructure planning process (Ref. 1.57);
- European Commission’s Overview of Natural and Man-made Disaster Risks the European Union May Face (Ref. 1.58);
- Reducing Risks, Protecting People: HSE’s decision making process (Ref. 1.59);
- HSE Major Hazard Regulatory Model: Safety Management in Major Hazard Sectors (Ref. 1.60);
- Defra’s The Green Leaves III Guidelines for Environmental Risk Assessment (Ref. 1.61); and
- The International Standards Organization’s ISO 31000:2018 Risk Management – Guidelines (Ref. 1.62).

1.3 Methodology

a) Scope of the assessment

- 1.3.1** The generic EIA methodology is described in **Volume 1, Chapter 6**. The methodology adopted for the MA&D assessment differs from the generic EIA methodology in that the MA&D assessment identifies the reasonably foreseeable worst-case environmental consequence of a hazard or a threat (i.e. the likely significant effect) on the basis of its potential severity of harm and duration. Subsequently, the likelihood of the environmental consequence occurring is determined.
- 1.3.2** The scope of assessment considers the likelihood and the reasonably foreseeable worst-case environmental consequence of potential hazards and threats that could occur during construction of the main development site (including the operation and removal and reinstatement of any temporary development) and the operation of permanent development (see **section 1.3d**).
- 1.3.3** The off-site developments for fen meadow and marsh harrier habitat creation have been scoped out of the MA&D assessment, as these works are not likely to be susceptible or create new MA&D hazards.
- 1.3.4** The aim of the assessment is to identify any expected significant adverse effects of the development on the environment deriving from the vulnerability

of the development to MA&D risks which are relevant to the Sizewell C Project and to identify any measures to prevent or mitigate any significant adverse effects.

1.3.5 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019. As the requirement for expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development to be assessed within the EIA process was introduced into the EIA Regulations in 2017, a MA&D assessment methodology was only provided within the 2019 EIA Scoping Report, see **Appendix 6A** of this volume.

1.3.6 Comments raised in the EIA Scoping Opinion on the MA&D assessment received in 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendix 6C** of this volume.

b) Consultation

1.3.7 The scope of the assessment has also been informed by consultation and engagement with statutory consultees. A summary of the general comments raised and SZC Co's responses is detailed in **Table 1.3**.

Table 1.3: Summary of consultation responses that have informed the scope and methodology of the MA&D assessment

Consultee	Date	Summary of Discussion/ Comments
Suffolk County Council (SCC), East Suffolk Council (ESC), Office for Nuclear Regulation (ONR), Environment Agency	14 th November 2019 (Meeting)	<p>The following elements were discussed at this meeting:</p> <ul style="list-style-type: none"> - study area - assessment criteria - relevant hazards and threats - scope of the assessment <p>A number of points were raised during the meeting and actions were set to ensure that the MA&D assessment made reference to the Civil Contingencies Act, and relevant guidance on the risk assessment process. It was agreed that the scope of the assessment was considered appropriate for the purposes of the EIA. Following this meeting an updated long list of hazards and threats was distributed and agreed to form the basis of the assessment. It was agreed that the study areas for hazards and threats would be reviewed in</p>

Consultee	Date	Summary of Discussion/ Comments
		response to comments received from the Environment Agency and SCC.
SCC	5 th December 2019 (Meeting)	During this meeting, agreement was reached on the assessment criteria and relevant hazards and threats to be considered on the long list. Further discussions were held on study areas and historical evidence to support the baseline assessment.
SCC	14 th January 2020 (Teleconference)	During this meeting a draft of the Environmental Risk Record (Volume 2, Appendix 27A) was discussed. SCC were provided with the opportunity to comment on the draft assessment.

1.3.8 Consultation with emergency services was also undertaken as part of the socio-economics workstream. Further details of the consultation undertaken are provided within **Volume 2, Chapter 9 Socio-economics** and the **Consultation Report** (Doc Ref. 5.1).

c) Study area

1.3.9 Each identified MA&D hazard and threat has been assigned an individual study area taking consideration of hazard or threat source, any identified impact pathways, potential receptors and the reasonably foreseeable worst-case environmental consequence, if the event occurred. The study area for the identification of potential receptors differs depending on the specific hazard or threat and is determined on the basis of a worst-case impact area of a similar incident that has previously occurred, if information on this is available, or on the basis of professional judgement, if not available. The study areas are identified within the Environmental Risk Record included in **Volume 2, Appendix 27A** and range from the area within the site boundary to the catchment area modelled for flood risk (as set out in the relevant **Flood Risk Assessments**, Doc Ref. 5.2-5.9).

1.3.10 The MA&D assessment also considered the affected highway network included within the scope of the **Transport Assessment** (Doc Ref. 8.5).

d) Assessment scenarios

1.3.11 The MA&D assessment considers the following two assessment scenarios:

- Construction assessment scenario which comprises:

- Construction at the main development site, including operation and removal and reinstatement of temporary development at the later stages of construction;
- Construction, operation and removal and reinstatement of temporary associated developments (i.e. northern park and ride, southern park and ride, freight management facility and green rail route);
- Operational assessment scenario which comprises:
 - Operation of the permanent development at the main development site; and
 - Operation of permanent associated developments (i.e. two village bypass, Sizewell link road, highway and rail improvements).

e) **Assessment criteria**

1.3.12 As described in **Volume 1, Chapter 6**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects. As discussed above, the MA&D assessment approach differs from the generic EIA methodology.

1.3.13 The assessment first identifies the reasonably foreseeable worst-case environmental consequence of a hazard or a threat (i.e. the likely significant effect) on the basis of its potential severity of harm and duration. However as by definition, all MA&D hazards and threats would result in serious damage (refer to **Table 1.1** for definition) and therefore, in significant environmental effects, the assessment then considers the likelihood of that hazard or threat occurring, whilst taking into account any proposed mitigation measures. The assessment then provides a conclusion on the tolerability and significance of the residual risk.

i. **Development of assessment criteria**

1.3.14 To establish an assessment criteria for the MA&D assessment and in response to feedback received during MA&D consultation meetings (see **section 1.3b**), the CCA risk assessment framework was compared against the requirements of the EIA Regulations to identify, if the CCA risk

assessment framework on its own would be sufficient to meet the requirements of the EIA Regulations.

1.3.15 It was considered that the receptors and assessment criteria provided within the CCA risk assessment framework were not sufficient to ensure compliance with the requirements of the EIA Regulations on their own, as the framework considered all environmental receptors in one category and did not provide a mechanism for taking into account mitigation.

1.3.16 As such, assessment criteria has been developed in accordance with the Chemical and Downstream Oil Industries Forum (CDOIF) Guidelines on Environment Risk Tolerability for COMAH Establishments, which is a common approach adopted in MA&D assessments in recent applications for Nationally Significant Infrastructure Projects. However for clarity, throughout the assessment criteria adopted within this ES, reference is also made to the criteria provided within the CCA risk assessment framework to allow for consistency with future emergency planning at a local level.

1.3.17 In line with CDOIF Guidelines, the assessment characterises hazards or threats against the following categories in order to assign a tolerability and a risk classification to each hazard or threat:

- severity of harm;
- duration;
- consequence; and
- probability.

1.3.18 Severity of harm, duration and the consequence of a hazard or threat are determined on the basis of a reasonably foreseeable worst-case effect of the event in the absence of mitigation. However, the probability of the hazard or threat occurring is determined whilst considering proposed mitigation measures. This is because mitigation would reduce the likelihood of the maximum severity of harm, duration, consequence and the frequency of a hazard or threat occurring.

ii. Receptor groups

1.3.19 In line with the assessment criteria set out within the CDOIF Guidelines, relevant receptor groups to MA&D hazards and threats have been divided into:

- populations, including members of the public and local communities;
- groundwater receptors;
- terrestrial (land) receptors, including agricultural land and sites of importance for nature conservation;
- freshwater receptors;
- marine receptors;
- built environment, including properties and built heritage assets; and
- critical infrastructure.

1.3.20 The CCA risk assessment framework uses different receptor group categories which broadly align with the above, however introduce additional criteria for considering effects on human receptors (referred to as ‘population’, ‘social’ and ‘economic’ categories of impact) and one category of impacts assigned to environmental receptors. These are set out below::

- **Population:** Encompassing direct health impacts (numbers of people affected, fatalities, injuries, human illness or injury, health damage) and indirect health impacts that arose because of strain on the health service;
- **Social:** Encompassing the social consequences of an event, including availability of social welfare provision; disruption of facilities for transport; damage to property; disruption of a supply money, food, water, energy or fuel, disruption of an electronic or other system of communication; homelessness, evacuation and avoidance of behaviour; and public disorder due to anger, fear and/or lack of trust in authorities;
- **Economic:** Encompassing the net economic cost, including both direct (e.g. loss of goods, buildings, infrastructure) and indirect (e.g. loss of business, increased demand for public services) costs; and
- **Environment:** Encompassing contamination or pollution of land, water or air, with harmful biological/chemical/radioactive matter or oil, flooding, or disruption or disruption of plant or animal life.

1.3.21 The consideration of the value or sensitivity of each receptor forms an inherent part of the severity of harm assessment, as described below.

iii. Severity of harm

- 1.3.22 The criteria used in the MA&D assessment for determining a hazard or threats' 'severity of harm' category are set out in **Table 1.4**.
- 1.3.23 This criteria has been developed from CDOIF Guidelines and HSE guidelines (Ref. 1.59). Reference is also made to the criteria provided within the CCA risk assessment framework.

Table 1.4: Assessment of the severity of harm for MA&D hazard and threats

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
Health	People (including workers, members of the public)	Insignificant number of injuries or impact on health	Small number of minor injuries	Small number of people affected, no fatalities, and small number of minor injuries with first aid treatment Or Moderate number of fatalities with some casualties requiring hospitalisation and medical treatment and activation of MAJAX ⁴ , the automated intelligent alert notification system, procedures	Substantial number of people requiring medical attention	Significant number of people in affected area impacted with multiple fatalities, multiple serious or extensive injuries Significant hospitalisation and activation of MAJAX procedures across a number of hospitals	Multiple life changing injuries, potential loss of life in low numbers.	Very large numbers of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalisation with serious injuries with longer-term effects	Potential loss of life in high numbers and substantial number of life changing injuries.

⁴ MAJAX – refers to major accident.

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
				in one or more hospitals					
Social		Insignificant number of persons displaced and personal support required Insignificant disruption to community services, including transport services and infrastructure		Minor damage to properties Minor displacement of a small number of people for < 24 hours and minor personal support required Minor localised disruption to community services or infrastructure < 24 hours Or Damage that is confined to a specific location, or to a		Significant damage that requires support for local responders with external resources 100 to 500 people in danger and displaced for longer than 1 week. Local responders require external resources to deliver personal support or Significant impact on, and possible breakdown of, delivery of some		Extensive damage to properties and built up environment in affected area requiring major demolition General and widespread displacement of more than 500 people for prolonged duration and extensive personal support required	

NOT PROTECTIVELY MARKED

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
				number of locations, but requires additional resources Localised displacement of >100 people for 1-3 days, or Localised disruption to infrastructure and community services		local community services.		Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support	
Economic	People (including workers, members of the public)	Insignificant impact on local economy	As above	Negligible impact on local economy and cost easily absorbed Or Limited impact on local economy with some short-term loss of production, with	As above	Significant impact on local economy with medium-term loss of production Significant extra clean-up and recovery costs	As above	Serious impact on local and regional economy with some long-term, potentially permanent, loss of production with some	As above

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
				possible additional clean-up costs				structural change Extensive clean-up and recovery costs.	
Environment	Designated Land/ Water Sites (Nationally important) (e.g. National Nature Reserve (NNR), Site of Special Scientific Interest (SSSI), Marine Nature Reserve (MNR))	Insignificant impact on environment or Minor impact on environment with no lasting effects	<0.5ha or <10%	Limited impact on environment with short-term or long-term effects	>0.5ha or 10-50% of site area, associated linear feature or population	Significant impact on environment with medium-to long-term effects	>50% of site area, associated linear feature or population	Serious long term impact on environment and/or permanent damage	n/a

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
Environment		Insignificant impact on environment or Minor impact on environment with no lasting effects	<0.5ha or <5% (<5% linear feature or population)	Limited impact on environment with short-term or long-term effects	>0.5ha or 5-25% of site area or 5-25% of associated linear feature or population	Significant impact on environment with medium-to long-term effects	25-50% of site area, associated linear feature or population	Serious long term impact on environment and/or permanent damage	>50% of site area, associated linear feature or population
Environment	Other Designated Land (e.g. Area of Outstanding Natural Beauty, National Park, etc.)	Insignificant impact on environment or Minor impact on environment with no lasting effects	<10ha or <10%	Limited impact on environment with short-term or long-term effects	10-100ha or 10-50% of land	Significant impact on environment with medium-to long-term effects	>100ha or >50% of land	Serious long term impact on environment and/or permanent damage	n/a
Environment	Scarce Habitat	Insignificant impact on environment or Minor	<2 ha or <10%	Limited impact on environment with short-term or long-term effects	2-20ha or 10-50% of habitat	Significant impact on environment with medium-to long-term effects	>20ha or >50% of habitat	Serious long term impact on environment	n/a

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
		impact on environment with no lasting effects						and/or permanent damage	
Environment	Widespread Habitat - Non designated Land	Insignificant impact on environment	<10ha	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Contamination of 10-100ha of land, preventing growing of crops, grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances.	Significant impact on environment with medium-to long-term effects	100-1000ha (applied as per text under 'Severe')	Serious long term impact on environment and/or permanent damage	>1000ha (applied as per text under 'Severe')

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
					Alternatively, contamination of 10ha or more of vacant land.				
Environment	Widespread Habitat - Non designated Water	Insignificant impact on environment or Minor impact on environment with no lasting effects	n/a	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Contamination of aquatic habitat which prevents fishing or aquaculture or renders is inaccessible to the public.	Significant impact on environment with medium-to long-term effects	n/a	Serious long term impact on environment and/or permanent damage	n/a
Environment	Groundwater Source of Drinking Water	Insignificant impact on environment or Minor impact on environment with no	Interruption of drinking water supply <1000 person-hours or for England &	Minor impact on environment with no lasting effects Or	Interruption of drinking water supplied from a ground or surface source	Significant impact on environment with medium-to long-term effects	>1 x 10 ⁷ person-hours interruption of drinking water (a town of ~100,000 people losing	Serious long term impact on environment and/or permanent damage	>1 x 10 ⁹ person-hours interruption of drinking (~1 million people losing supply for 1 month)

NOT PROTECTIVELY MARKED

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
		lasting effects	Wales only <1ha Source Protection Zone (SPZ)	Limited impact on environment with short-term or long-term effects	(where persons affected x duration in hours [at least 2] > 1,000) or For England & Wales only 1-10ha of SPZ where drinking water standards are breached		supply for month) or for England & Wales only 10-100ha SPZ drinking water standards breached		or for England & Wales only >100ha SPZ drinking water standards breached
Environment	Groundwater – non Drinking Water Source	Insignificant impact on environment or Minor impact on environment with no	<1ha	Minor impact on environment with no lasting effects Or Limited impact on environment with	1-100ha of aquifer where water quality standards are breached (or hazardous substance is discernible)	Significant impact on environment with medium-to long-term effects	100-10,000ha	Serious long term impact on environment and/or permanent damage	>10,000ha

NOT PROTECTIVELY MARKED

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
		lasting effects		short-term or long-term effects					
Environment	Groundwater in unproductive strata	Insignificant impact on environment or Minor impact on environment with no lasting effects	Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.	Significant impact on environment with medium-to long-term effects	Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.	Serious long term impact on environment and/or permanent damage	Where the groundwater is a pathway for another receptor assess against relevant criteria for the receptor.
Environment	Soil or sediment (i.e. as receptor rather than purely a pathway)	Insignificant impact on environment or Minor impact on environment with no lasting effects	Contamination not leading to environmental damage (as per Environmental Liability Directive), or not	Minor impact on environment with no lasting effects Or Limited impact on environment with	Contamination of 10-100ha of land etc. as per Widespread Habitat; Contamination sufficient to be deemed environmental	Significant impact on environment with medium-to long-term effects	Contamination of 100-1,000ha of land, as per Widespread Habitat; Contamination rendering the soil immediately	Serious long term impact on environment and/or permanent damage	Contamination of >1,000ha of land, as per Widespread Habitat; Contamination rendering the soil immediately hazardous to

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
			significantly affecting overlying water quality	short-term or long-term effects	damage (Environmental Liability Directive)		hazardous to humans (e.g. skin contact) or the living environment, but remediation available		humans (e.g. skin contact) or the living environment and remediation difficult or impossible.
Environment	Built environment <i>Under CDOIF, this is limited to Grade 1 / Cat A Listed buildings, scheduled ancient monuments</i>	Insignificant impact on environment or Minor impact on environment with no lasting effects	Damage below a level at which designation of importance would be withdrawn.	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Damage sufficient for designation of importance to be withdrawn.	Significant impact on environment with medium-to long-term effects	Feature of built environment subject to designation of importance entirely destroyed.	Serious long term impact on environment and/or permanent damage	n/a

NOT PROTECTIVELY MARKED

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
	<i>conservation area, etc</i>								
Environment	Particular species (Note - these criteria apply nationally - i.e. England, Wales, Scotland)	Insignificant impact on environment or Minor impact on environment with no lasting effects	Loss of <1% of animal or <5% of plant ground cover in a habitat.	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Loss of 1-10% of animal or 5-50% of plant ground cover.	Significant impact on environment with medium-to long-term effects	Loss of 10-90% of animal or 50-90% of plant ground cover.	Serious long term impact on environment and/or permanent damage	Total loss (>90%) of animal or plant ground cover.
Environment	Marine	Insignificant impact on environment or Minor impact on environment with no lasting effects	<2ha littoral or sublittoral zone, <100ha of open sea benthic community, <100 dead sea birds (<500 gulls), <5	Minor impact on environment with no lasting effects Or Limited impact on environment with	2-20ha littoral or sublittoral zone, 100-1,000ha of open sea benthic community, 100-1000 dead sea birds (500-	Significant impact on environment with medium-to long-term effects	20-200ha littoral or sub-littoral zone, 100-10,000ha of open sea benthic community, 1,000-10,000	Serious long term impact on environment and/or permanent damage	>200ha littoral or sublittoral zone, >10,000ha of open sea benthic community, >10,000 dead sea birds (>50,000

NOT PROTECTIVELY MARKED

Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
			dead/significantly impaired sea mammals	short-term or long-term effects	5,000 gulls), 5-50 dead/significantly impaired sea mammals		dead sea birds (5,000-50,000 gulls), 50-500 dead/significantly impaired sea mammals		gulls), >500 dead/significantly impaired sea mammals
Environment	Fresh and estuarine water habitats	Insignificant impact on environment or Minor impact on environment with no lasting effects	Impact below of Severe	Minor impact on environment with no lasting effects Or Limited impact on environment with short-term or long-term effects	Water Framework Directive (WFD) Chemical or ecological status lowered by one class for 2-10km of watercourse or 2-20ha or 10-50% area of estuaries or ponds.	Significant impact on environment with medium-to long-term effects	WFD Chemical or ecological status lowered by one class for 10-200km of watercourse or 20- 200ha or 50-90% area of estuaries and ponds. Plus interruption	Serious long term impact on environment and/or permanent damage	WFD Chemical or ecological status lowered by one class for >200km of watercourse or >200ha or >90% area of estuaries and ponds. Plus interruption of

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Assessment Terminology		No Serious Damage		Severe		Major		Catastrophic	
Receptors (CCA cat)	Receptors (CDOIF cat).	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.	CCA Ref	CDOIF ref.
		Insignificant	No Serious Damage	Minor or Moderate	Severe	Significant	Major	Catastrophic	Catastrophic
					Plus interruption of drinking water supplies		of drinking water supplies		drinking water supplies

iv. Duration

1.3.24 The criteria for the assessment of the duration of harm is also based on CDOIF and HSE Guidelines and are shown in **Table 1.5**. The CCA risk assessment framework only provides guidance on the duration of harm under social (population) receptors.

Table 1.5: Assessment of the duration of harm

Receptor	Short Term	Medium Term	Long Term	Very Long Term or Permanent
Population	Injury or impairment lasting up to 1 week	Injury or impairment lasting up to 4 months but no permanent consequences	Some permanent restriction to leisure and work activities	Death/fatality
Groundwater or surface water drinking water source (public or private)	n/a	n/a	Harm affecting drinking water source or SPZ < 6 years	Harm affecting drinking water source or SPZ >6 years
Groundwater (except drinking water sources): WFD Hazardous / Non Hazardous Substances	WFD hazardous substances < 3 months	WFD hazardous substances > 3 months	WFD hazardous substances > 6yrs	WFD hazardous substances >20 years
	WFD non-hazardous substances < 1yr	WFD non-hazardous substances > 1y	WFD non-hazardous substances >10 years	WFD non-hazardous substances >20 Years
Surface water (except drinking water sources – see above)	< 1year	>1 year	>10 years	>20 years
Land	< 3 years or < 2 growing seasons for agricultural land	> 3 years or > 20 growing seasons for agricultural land	>20 years	>50 years
Built environment	Can be repaired in < 3 years, such that its	Can be repaired in > 3 years, such that its	Feature destroyed, cannot be rebuilt, all	Feature destroyed, cannot be rebuilt,

Receptor	Short Term	Medium Term	Long Term	Very Long Term or Permanent
	designation can be reinstated	designation can be reinstated	features except world heritage site	world heritage site
Marine	<1 year	>1 year	>10 years	>20 years

v. Level of Consequence

1.3.25 The level of consequence matrix for the MA&D assessment has been defined using CDOIF Guideline and is shown in **Table 1.6**. Level of consequence considers the severity of harm and the duration of the harm to separate hazards and threats into five categories ('Not a MA&D' and categories A to D). 'Not a MA&D' represents the lowest level of consequence and category 'D' the highest.

Table 1.6

		Duration			
		Short term	Medium term	Long term	Very long term or permanent
Severity of Harm	Catastrophic	Not a MA&D	C	D	D
	Major	Not a MA&D	B	C	D
	Severe	Not a MA&D	A	B	C
	No Serious Damage	Not a MA&D	Not a MA&D	Not a MA&D	Not a MA&D

1.3.26 **Table 1.7** provides a comparison of the level of consequence between the criteria set out within the CCA risk assessment framework and the CDOIF Guidelines.

Table 1.7: Comparison of categories of consequence with CCA risk assessment framework and CDOIF Guidelines

CCA	CDOIF
1	Not a MA&D
2	A
3	B

CCA	CDOIF
4	C
5	D

1.3.27 For the purposes of this assessment, those hazards or threats which are considered to be a level 1 event under the CCA risk assessment framework are not considered to constitute a MA&D and are screened out of further assessment. Hazards or threats considered to be a level 2 event, whilst not considered an emergency under the CCA risk assessment framework, are considered to constitute a MA&D as they could result in serious damage as defined for the purposes of this assessment (refer to **Table 1.1**).

vi. [Probability of a hazard or threat occurring](#)

1.3.28 The probability of a hazard or threat occurring has been assessed in accordance with the definitions provided within **Table 1.8**, which are based on CDOIF Guidelines and the CCA risk assessment framework.

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Table 1.8: Definitions of probability

Probability	Extremely Improbable	Extremely Remote	Remote	Rare	Unlikely	Likely	
CDOIF Quantitative Definition	Less than 1 in 10,000,000 years	1 in 1,000,000 years to 1 in 10,000,000 years	1 in 100,000 years to 1 in 1,000,000	1 in 10,000 to 1 in 100,000 years	1 in 100 years to 1 in 10,000 years	Greater than 1 in 100 years	
CCA Quantitative Definition	> 1 in 20,000 chance over 5 years			> 1 in 2,000 chance over 5 years	> 1 in 200 chance over 5 years	> 1 in 20 chance over 5 years	> 1 in 2 chance over 5 years
CCA Qualitative Descriptor	Negligible			Rare	Unlikely	Possible	Probable

vii. Classification of risk

1.3.29 Following CDOIF guidelines, the tolerability of a risk is identified by considering the consequence of a hazard or threat and the probability of the hazard or threat occurring. This is similar to the CCA risk assessment framework which classifies risks using 'impact' and 'likelihood'. The matrix below (**Table 1.9**) identifies how risks are classified in the MA&D assessment.

1.3.30 For comparison, high and very high risks under the CCA risk assessment framework would fall under the 'intolerable' risk classification within **Table 1.9**, as they are 'primary or critical risks'.

Table 1.9: Classification of risk

Consequence	Probability					
	Extremely improbable	Extremely remote	Remote	Rare	Unlikely	Likely
D	Tolerable	TifALARP*	Intolerable	Intolerable	Intolerable	Intolerable
C	Tolerable	Tolerable	TifALARP*	Intolerable	Intolerable	Intolerable
B	Tolerable	Tolerable	Tolerable	TifALARP*	Intolerable	Intolerable
A	Tolerable	Tolerable	Tolerable	Tolerable	TifALARP*	Intolerable
Not a MA&D	Not within the scope of MA&D assessment					

*TifALARP – Tolerable if As Low As Reasonably Practicable

1.3.31 Following the classification of a risk, as presented in **Table 1.9**, a clear statement is made as to whether the risk is 'significant' or 'not significant'. As a general rule, intolerable risks are considered to be significant and tolerable or Tolerable if As Low As Reasonably Practicable (TifALARP)⁵ risks are considered to be not significant. However, professional judgement is also applied, where appropriate.

⁵ "ALARP" is short for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. (1.66). The ALARP principle is used to describe an expected level of residual risk involved with a system or set of operations, in case it is not possible to eliminate the risk. What this means, is that the applicant, overseen by regulatory authorities, is responsible for exercising good practice and judgement to ensure that necessary measures have been taken in order to reduce the levels of risk, such that the residual risk levels are 'as low as reasonably practicable'. Risks categorised 'tolerable if ALARP' would generally require further approval of the details for proposed mitigation by a regulatory body.

viii. Assessment of radiological hazards

- 1.3.32 As identified within the EIA Regulations⁶, and further supported by paragraph 2.7.4 of NPS EN-6 (Ref. 1.48), the MA&D assessment can draw on assessments carried out pursuant to other legislation provided that the requirements of the EIA Regulations are still met.
- 1.3.33 A detailed assessment of safety, security and environmental risks associated with the UK EPRTM design has been undertaken as part of the Generic Design Assessment (GDA) process. A Design Acceptance Confirmation (DAC) was granted by the Office for Nuclear Regulation (ONR) and a Statement of Design Acceptability (SoDA) was issued by the Environment Agency in December 2012, confirming that the risks to the public and the environment had been eliminated or mitigated by design sufficiently to be considered as acceptable.
- 1.3.34 Furthermore, a detailed assessment of site specific nuclear safety and security risks would be undertaken as part of the nuclear site licensing regime. For compliance with the nuclear site licensing regime, SZC Co. would need to ensure the safe operation of the Sizewell C Project and protection of the workers, public and environment. This includes providing the ONR with a robust Safety Case demonstrating that all hazards associated with the development or that may impact the development are well understood and adequate arrangements are in place to reduce these risks to an acceptable level. In addition, it requires appropriate emergency plans and arrangements to be established and agreed with the local authority, for the range of accidents and incidents that could occur. It is considered that the ONR would not grant a nuclear site licence for the Sizewell C Project, unless it is demonstrated that all nuclear safety and security risks have been mitigated to ALARP levels.
- 1.3.35 Having regard to that context, it has been agreed with the ONR, Environment Agency, SCC and ESC that with the regulatory processes in place surrounding the safety and security of the UK EPRTM reactors and the operation of the site, a detailed assessment of nuclear safety and security risks is not required to be presented as part of the EIA. Instead, it is considered that compliance with existing regulatory regimes would reduce nuclear safety and security risks to be tolerable if ALARP (not significant).

⁶ Schedule 4, paragraph 8 of the Infrastructure Planning EIA Regulations and Schedule 3, paragraph 9 of the Marine Works EIA Regulations.

1.3.36 The MA&D assessment therefore provides a summary of the types of hazards covered by the GDA, nuclear site licensing and other regulatory regimes, their reasonably foreseeable worst-case environmental consequence and a summary of the required mitigation, in the form of regulatory requirements, to reduce these risks to ALARP. This is to ensure that the processes for mitigating nuclear safety and security risks are transparent and understood by all.

ix. [Assessment of marine navigation risks](#)

1.3.37 A separate assessment of MA&D associated with marine navigation risk is presented within **Volume 2, Chapter 24** and follows a separate assessment methodology. A summary of the findings of the marine navigation risk assessment is presented within the MA&D assessment in **Volume 2, Chapter 27**.

e) [Assessment methodology](#)

i. [Establishing the baseline](#)

[Existing baseline](#)

1.3.38 Baseline assessment for identifying source-pathway-receptor linkages for MA&D hazards and threats includes the following:

- A review of potential natural hazards which may impact the Sizewell C Project, including meteorological hazards, geological hazards and other types of hazards, such as space weather;
- Existing major accident hazard and threat sources within the site or off-site within the study area;
- Other hazards and threats identified within the UK National Risk Register (Ref 1.63) and Suffolk Resilience Forum (SRF) Community Risk Register (Ref 1.644). and
- Sensitive environmental receptors within the study area at risk of MA&D hazards and threats.

1.3.39 The baseline presented within the MA&D assessment has utilised baseline information presented within other technical assessments of the **Volumes 2 to 9** of the ES, where relevant. This information has been used to establish existing hazards and threats at Sizewell C Project sites that may impact the

Sizewell C Project and to identify the receptors considered within the MA&D assessment.

1.3.40 The technical assessments of the EIA considered in the baseline review included:

- conventional waste management;
- socio-economics;
- transport;
- terrestrial ecology and ornithology;
- historic environment;
- soils and agriculture;
- geology and land quality;
- groundwater and surface water;
- marine ecology;
- marine navigation;
- radiological assessment; and
- climate change.

1.3.41 Other information relevant to the baseline assessment which has informed the identification of potential MA&D source-receptor-pathway linkages within the defined study areas includes the following:

- sites with existing Nuclear Site Licences, COMAH and / or a Hazardous Substance Consents;
- sites permitted by the Environment Agency for landfill or mining;
- utilities; and
- other key infrastructure, such as railway lines and main roads.

1.3.42 The following documents were also reviewed to inform the assessment:

- Sizewell C Project risk registers;

- **Code of Construction Practice** (Doc. Ref 8.11);
- **Flood Risk Assessments** (Doc. Ref 5.2 to 5.9);
- European Commission's Overview of Natural and Man-made Disaster Risks the European Union may face;
- Cabinet Office National Risk Register of Civil Emergencies (Ref. 1.63);
- Suffolk Community Risk Register (Ref. 1.64); and
- European Commission's Major Accident Reporting System (eMARS) (Ref. 1.65).

Future baseline

1.3.43 **Volume 10, Appendix 1B** identifies development considered as part of the future baseline, as they are assumed to have been constructed before or during the construction of the Sizewell C Project.

1.3.44 The identified schemes have therefore been considered as potential receptors to MA&D risks during construction and operation of the Sizewell C Project. Furthermore, the identified schemes have also been reviewed with regards to whether they are likely to give rise to new off-site hazards that could impact the Sizewell C Project.

1.3.45 The consideration of increased frequency and severity of natural hazards due to climate change is inherent within the assessment, as the reasonably foreseeable worst-case consequence of each hazard related to climate change has been determined.

1.3.46 A description of the future baseline as relevant to the MA&D assessment is presented within **Volume 2, Chapter 27**.

ii. Identification, screening and assessment of MA&D hazards and threats

1.3.47 The MA&D assessment considers the potential for significant risks to occur due to the following:

- vulnerability of the Sizewell C Project to a natural disaster;
- potential for the Sizewell C Project to create a new or alter an existing source of a major accident;

- potential for the Sizewell C Project to create a new pathway between a source of a MA&D and receptor; and
- potential for the Sizewell C Project to impact on the vulnerability of a receptor to a MA&D hazard or threat.

1.3.48 The assessment methodology follows the below staged process:

- Stage 1: Identification of hazards and threats;
- Stage 2: Screening of hazards and threats (including the identification of the reasonably foreseeable worst-case environmental consequence, i.e. the likely significant effect);
- Stage 3: Identification of mitigation; and
- Stage 4: Identification of residual risks and their significance.

1.3.49 In summary, the approach considers the reasonably foreseeable worst-case environmental consequences of the identified hazards and threats (i.e. the likely significant effect), the probability of these consequences (likely significant effects) occurring, taking into account proposed mitigation, and the acceptability of the subsequent risk to the environment. The assessment process is iterative with the aim to identify sufficient controls to mitigate all MA&D risks to be not significant.

Stage 1 - Identification of hazards and threats

1.3.50 During stage 1, a risk record was developed to identify reasonably foreseeable MA&D hazards and threats to be considered as part of the EIA. To avoid duplication of risk assessments, existing and planned risk assessments, impact assessments and other studies were used to identify hazards and threats which may arise due to the Sizewell C Project. For example hazards related to marine navigation are considered within the navigational risk assessment presented in **Volume 2, Chapter 24** and summarised within the MA&D assessment (**Volume 2, Chapter 27**).

1.3.51 A long list of identified reasonably foreseeable MA&D hazards and threats was prepared and discussed with ESC, SCC, Environment Agency and ONR. This included the consideration of both existing sources and new sources of hazards that could be introduced as a result of the Sizewell C Project.

- 1.3.52 All MA&D hazards and threats were collated into an Environmental Risk Record (see **Volume 2, Appendix 27A**). This record acts as an evidence base of all the identified hazards and threats relevant to the MA&D assessment.

Stage 2 - Screening of hazards and threats

- 1.3.53 Following the completion of the Environmental Risk Record (**Volume 2, Appendix 27A**) each hazard and threat has then been reviewed to determine whether a source-pathway-receptor linkage exists to any of the identified environmental receptors. Hazards and threats with no linkages were screened out from the further assessment.
- 1.3.54 For each hazard or threat with a linkage pathway, the reasonably foreseeable worst-case environmental consequence (i.e. the likely significant effect) was identified and categorised on the basis of the ‘severity of harm’ and ‘duration’ definitions set out in **section 1.3e**). These reasonably foreseeable worst-case consequences of hazards and threats were then screened against the definition of ‘serious damage’ (refer to **Table 1.1** and **Table 1.9**) to remove those which are not considered to fall within the scope of a MA&D. In addition, those hazards and threats considered to result in reasonably foreseeable worst-case consequences with short-term durations were also not considered to constitute a MA&D, in accordance with the assessment criteria.
- 1.3.55 **Table 1.10** outlines the criteria for notifying the European Commission of the occurrence of a major accident in Annex V of the Seveso III Directive. These criteria offer further guidance to what consequences might constitute a ‘serious damage’ and have been used to inform this screening process.

Table 1.10: Criteria for notification of a major accident to the European Commission

Paragraph	Consequence
1	Injury to persons and damage to property
a	a death;
b	six persons injured within the establishment and hospitalized for at least 24 hours;
c	one person outside the establishment hospitalised for at least 24 hours;
d	a dwelling outside the establishment damaged and unusable as a result of the accident;
e	the evacuation or confinement of persons for more than 2 hours where

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Paragraph	Consequence
	the value (persons × hours) is at least 500; or
f	the interruption of drinking water, electricity, gas or telephone services for more than 2 hours where the value (persons × hours) is at least 1,000.
2	Immediate damage to the environment
a	permanent or long-term damage to terrestrial habitats – i. 0.5 hectares or more of a habitat of environmental or conservation importance protected by legislation; or ii. 10 or more hectares of more widespread habitat, including agricultural land;
b	significant or long-term damage to freshwater and marine habitats – i. 10 km or more of river or canal; ii. 1 hectare or more of a lake or pond; iii. 2 hectares or more of delta; or iv. 2 hectares or more of a coastline or open sea; or
c	significant damage to an aquifer or underground water: 1 hectare or more.
3	Damage to property
a	damage to property in the establishment, to the value of at least EUR 2,000,000; or
b	damage to property outside the establishment, to the value of at least EUR 500,000.
4	Cross-border damage: any major accident directly involving a dangerous substance giving rise to consequences outside the territory of the Member State concerned.

Stage 3 - Identification of mitigation

- 1.3.56 As part of stage 3 of the assessment, primary and tertiary mitigation measures that are either embedded within design, required for compliance with legislation, other regulatory regimes, or represent standard practice, and reduce the risk of MA&D hazards and threats were identified. These mitigation measures include controls which may reduce the probability of a risk or prevent the reasonably foreseeable worst-case consequence of a hazard or threat occurring. A description of these measures is included within **Volume 2, Chapter 27** and **Volume 2, Appendix 27A**.

1.3.57 Following the consideration of primary and tertiary mitigation, the likelihood of the hazard or threat occurring was determined on the basis of the probability criteria set out in **section 1.3e**). The identified probability was then combined with the level of consequence identified at stage 2 to determine risks that are considered acceptable (or tolerable), tolerable if ALARP and unacceptable (or intolerable). This process utilised the criteria set out in **section 1.3e**.

1.3.58 As, the aim of the assessment is to identify sufficient mitigation to avoid significant risks, an iterative approach was adopted and further mitigation measures (secondary mitigation) specified, where required.

1.3.59 For example, if a risk event has been managed appropriately in terms of safety of staff, but the actions taken to manage this risk do not adequately mitigate the potential for long-term or irreversible harm to an environmental resource and/or receptor, secondary mitigation might be required.

Stage 4 - Identification of residual risks and their significance

1.3.60 Following the consideration of all mitigation proposed, a residual risk category was assigned as part of stage 4 of the assessment and the significance of the residual risks determined (refer to risk classification categories set out in **section 1.3e**). A record of how each risk is assessed has been maintained in the Environmental Risk Record (**Volume 2, Appendix 27A**).

iii. Inter-relationships

1.3.61 The MA&D assessment has inherently considered inter-relationship effects with other topics being assessed as part of the EIA which present hazard sources or have the potential to affect an identified receptor.

f) Assumptions and limitations

1.3.62 The following limitations are relevant to this assessment:

- No modelling or detailed calculations have been undertaken but a qualitative assessment approach has been adopted.
- Where information is not available (such as historical evidence on the likelihood and the environmental consequence of an event), professional judgement has been used to reach a conclusion.

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- Each hazard or threat has been considered on an individual basis. Where a hazard or threat has the potential to result in chain reaction, this has been clearly identified within the Environmental Risk Record (**Volume 2, Appendix 27A**) to identify where an assessment of the additional hazard or threat that could occur can be found.
- No surveys beyond those undertaken to inform other EIA topics have been completed to establish the baseline for the MA&D assessment.

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Figures

None provided.

1. Health and Wellbeing Legislation and Methodology

1.1 Introduction

1.1.1 This appendix sets out the legislation, policy, guidance and methodology relevant to the assessment of likely significant health and wellbeing effects of the Sizewell C Project.

1.1.2 The methodology set out in this appendix has been used to determine the likely significant effects of the Sizewell C Project as described in **Chapter 28 of Volume 2 of the Environmental Statement (ES)**.

1.1.3 Due to the multidisciplinary nature of health and wellbeing, there are several inter-relationships between the health and wellbeing chapter and other technical disciplines, most notably: air quality; noise and vibration; traffic and transport; socio-economics; and the radiological assessment.

1.1.4 The health and wellbeing chapter (see **Chapter 28 of Volume 2 of the ES**) partially draws from and builds upon key outputs from these technical disciplines to further assess and report the likely effects upon health and wellbeing.

1.2 Legislation, policy and guidance

1.2.1 This section identifies and describes legislation, policy and guidance of relevance to the assessment of the likely significant health and wellbeing effects of the Sizewell C Project.

1.2.2 Legislation and policy have been considered on an international, national, regional, and local level. The following is considered to be relevant to the health and wellbeing assessment as it has influenced the identification and categorisation of sensitive resources and receptors, requirements for mitigation, or the scope and/or method of assessment.

a) International

i. [2014/52/EU Directive amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment](#)

1.2.3 Article 3 of the amended European Union (EU) Environmental Impact Assessment (EIA) Directive (Ref 1.1) reinforces the consideration of human health within the EIA process, requiring the assessment to identify, describe and assess in an appropriate manner, in light of each individual case, the

direct and indirect significant effects of a project on population and human health.

b) National

i. Environmental Impact Assessment Regulations

1.2.4 Following the transposition of the amended EIA Directive 2014/52/EU (Ref. 1.1) into UK legislation by the Infrastructure Planning (EIA) Regulations 2017 (Ref. 1.2) and the Marine Works (EIA) Regulations 2007 (Ref. 1.3) (collectively referred to as the ‘EIA Regulations’), the regulations require that:

“the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors — (a) population and human health”.

ii. National Policy Statement

1.2.5 The NPSs that are relevant to the Sizewell C Project are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 1.4) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 1.5). NPS EN-1 and NPS EN-6 were considered by Parliament and formally designated in July 2011.

1.2.6 As explained in further detail in the **Planning Statement** (Doc Ref. 8.4), whilst NPS EN-1 and EN-6 do not formally have effect to the Sizewell C DCO application, it is appropriate to treat them as providing the primary policies relevant to the determination of the application.

1.2.7 The NPSs set out the Government’s energy policy; the need for new infrastructure; and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants’ assessments of the effects of their scheme, and how the decision maker should consider these impacts.

1.2.8 A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account, is provided in **Table 1.1**.

Table 1.1: Requirements of the National Policy Statements

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
EN-1		

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
Paragraph 4.13.2	<i>“[...] where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate.”</i>	An assessment of likely significant effects on health and wellbeing is presented in Volume 2, Chapter 28 of the ES .
	<i>“The impacts of more than one development may affect people simultaneously, so the applicant and the IPC should consider the cumulative impact on health”.</i>	A cumulative effects assessment with other plans and projects is presented in Volume 10, Chapter 4 of the ES .
Paragraph 4.13.3	<i>“The direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests”.</i>	All relevant potential impacts on health and wellbeing have been considered in Volume 2, Chapter 28 of the ES .
Paragraph 4.13.4	<i>“New energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity”.</i>	Indirect health impacts have been considered in Volume 2, Chapter 28 of the ES .
Paragraph 4.13.5	<i>“those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either constitute a reason to refuse consents or require specific mitigation under the Planning Act 2008. However, the IPC will want to take account of health concerns when setting requirements relating to a range of impacts such as noise”.</i>	All relevant potential impacts on health and wellbeing have been considered in Volume 2, Chapter 28 of the ES .
EN-6		
Paragraph 3.12.5	<i>“In common with other major industrial processes, the construction, operation and decommissioning of new nuclear power stations could affect health care provision. For example, the facility could increase demand on health monitoring services.”</i>	Indirect health impacts have been considered in Volume 2, Chapter 28 of the ES .
Paragraph 3.12.6	<i>“The Nuclear AoS also identified that there could be positive effects for health and wellbeing resulting from the positive socio-economic benefits of new nuclear power stations”</i>	Indirect health impacts have been considered in Volume 2, Chapter 28 of the ES .
Paragraph 3.12.7	<i>“The applicant should work with the local authority and the local primary care trust (in England) or the Health Board (in Wales) to identify any potentially significant health impacts and appropriate</i>	A summary of consultation undertaken is provided within section 1.3b of this Appendix.

Ref.	NPS Topic Requirement	How the Requirement has Been Addressed
	<i>mitigation measures. Where such measures relate to better public information on the extent of risk in relation to radiological hazard, the applicant should consult the Health Protection Agency on the appropriate standards for radiological protection"</i>	
Paragraph 3.12.10	<i>"The IPC should consider the positive effect of employment and other socioeconomic impacts [...] on human health and wellbeing"</i>	Indirect health impacts have been considered in Volume 2, Chapter 28 of the ES .

iii. Marine Policy Statement

- 1.2.9 The Marine Policy Statement (Ref. 1.6) sets the framework for preparing Marine Plans and taking decisions affecting the marine environment. A summary of the relevant Marine Policy Statement considerations, together with how these have been taken into account, is provided in **Table 1.2**.

Table 1.2: Considerations of the Marine Policy Statement

Ref.	MPS Considerations	How the Consideration has been Addressed
Paragraph 2.6.2.1	<i>"Activities and developments in the marine and coastal area can have adverse effects on air quality at various stages. The construction, operation and decommissioning phases of projects can involve emissions to air which could lead to adverse impacts on human health, biodiversity, or on the wider environment."</i>	All relevant potential impacts on health and wellbeing have been considered in Volume 2, Chapter 28 of the ES , drawing on findings from Volume 2, Chapter 12 of the ES (air quality) and Chapter 5 of Volume 3 to 9 of the ES .
Paragraph 2.6.3.3	<i>"Noise from marine activities can also affect people. An EU Directive on Environmental Noise (EU 2002/49/EC) that deals with noise impacts on people is currently under review. Excessive noise can have wide ranging impacts on the quality of human life, health, and use and enjoyment of areas, including those with high visual quality. Its impact therefore needs to be considered and managed appropriately."</i>	All relevant potential impacts on health and wellbeing have been considered in Volume 2, Chapter 28 of the ES , drawing on findings from Volume 2, Chapter 11 of the ES (noise and vibration) and Chapter 4 of Volume 3 to 9 of the ES .

iv. National Planning Policy Framework 2019

- 1.2.10 The National Planning Policy Framework (NPPF) 2019 (Ref. 1.7) sets out the Government's planning policy at the national level, though it does not contain specific policies for nationally significant infrastructure projects. These are to be determined in accordance with the decision-making framework in the Act and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).
- 1.2.11 Promoting healthy and safe communities is a central theme of the NPPF, which states that planning policies and decisions should aim to achieve healthy, inclusive, and safe places which: promote social interaction, are safe and accessible, and enable and support healthy lifestyles (paragraph 91). The health and wellbeing baseline has been established and assessed in accordance with NPPF.

v. Planning Practice Guidance

- 1.2.12 Promoting healthy and safe communities is a central category of the revised Planning Practice Guidance (Ref. 1.8) which provides guidance on:
- achieving healthy and inclusive communities;
 - promoting the benefits of estate regeneration;
 - supporting the delivery of sufficient school places to meet the needs of existing and new communities; and
 - supporting safe communities.
- 1.2.13 The health and wellbeing baseline has been established and assessed in accordance with Planning Practice Guidance.

vi. Government's 25 Year Environment Plan

- 1.2.14 The Government's 25 Year Environment Plan (Ref. 1.9) includes consideration of health and wellbeing within its goals, stating the following:
- *"We will reduce the risk of harm to people, the environment and the economy from natural hazards including flooding, drought and coastal erosion by:*
 - *making sure everyone is able to access the information they need to assess any risks to their lives and livelihoods, health and prosperity posed by flooding and coastal erosion [...]*

- *We will conserve and enhance the beauty of our natural environment, and make sure it can be enjoyed, used by and cared for by everyone. We will do this by:*
 - *making sure that there are high quality, accessible, natural spaces close to where people live and work, particularly in urban areas, and encouraging more people to spend time in them to benefit their health and wellbeing.”*

c) Regional

- 1.2.15** There is no regional policy deemed relevant to the assessment of health and wellbeing for the Sizewell C Project.

d) Local

- 1.2.16** The Sizewell C Project main development site lies within the administrative boundary of East Suffolk Council (ESC), formerly Suffolk Coastal District Council (SCDC). In May 2018, Parliament approved the creation of ESC as a new local authority, to replace both SCDC and Waveney District Council. On 1 April 2019, ESC was formally established in place of SCDC and Waveney District Council.

- 1.2.17** Accordingly, there are two parts to ESC’s Local Plan, the Suffolk Coastal Local Plan (SCLP) and the Waveney Local Plan. The Sizewell C Project is located within the area covered by the SCLP.

- 1.2.18** The adopted SCLP comprises the: ‘saved policies’ of the SCLP (incorporating first and second alterations) (2001 and 2006); the Core Strategy and Development Policies Development Plan Document (2013) (Ref 1.10); and the Site Allocations and Area Specific Policies Development Plan Document (2017) (Ref 1.11).

- 1.2.19** In March 2019, SCDC submitted their draft new SCLP (January 2019) (Ref 1.12) to the Secretary of State for independent examination. Once adopted the new Local Plan will replace all elements of the adopted local plan listed above.

i. Suffolk Coastal Local Plan Core Strategy and Development Management Policies

- 1.2.20** Strategic Policy SP13 – Nuclear Energy of the Core Strategy states that:
“In respect of the possibility of additional nuclear power stations at Sizewell, the Council considers the local issues that need to be adequately addressed consist of at least the following:

- (j) *Social issues – local community issues during long construction period and the housing of workers in the local [...]* (Ref. 1.10).

ii. [Suffolk Coastal Final Draft Local Plan 2019](#)

1.2.21 The Suffolk Coastal Final Draft Local Plan (Ref. 1.12) identifies health as a relevant theme to be considered for energy infrastructure proposals, and requires the following aspects to be considered for health:

- *“construction and transportation noise impact on local communities;*
- *long term loss of tranquil areas;*
- *loss of large areas of countryside used for leisure and tourism; and*
- *negative impact on air quality.”*

1.2.22 Draft Policy SCLP3.4: Proposals for Major Energy Infrastructure Projects of the Suffolk Coastal Final Draft Local Plan states that the Council seeks to work in partnership with the developer, local communities, and other stakeholders to ensure that the aforementioned considerations achieve significant community benefits.

iii. [Suffolk Joint Health and Wellbeing Board Strategy Refresh 2019-2022](#)

1.2.23 The Suffolk Joint Health and Wellbeing Strategy (JHWS) (Ref 1.13) states that:

“The Board are committed to developing a Health in All Policies (HIAP) approach wherever possible. HIAP is a collaborative approach, that aims to improve everyone’s health by incorporating health considerations into decision making across sectors, policy and service areas, as well as addressing the wider determinants of health.”

1.2.24 The strategy will be turned into action through specific areas of focus within each of the priorities in the strategy:

Table 1.3: Suffolk JHWS relevant areas of focus

Priority	Areas of Focus
2. People of working age are supported to optimise their health and wellbeing	Prevent cardiovascular disease in Suffolk, including supporting people to be healthy at work
4. People in Suffolk have the opportunity to Improve their Mental Health and Wellbeing	Ensure Suffolk residents have access to good quality, effective and equitable mental health services when they need them

e) Guidance

- 1.2.25 While the EIA Regulations (Ref. 1.2) reinforce the assessment of human health within the planning process, there is no definitive guidance on the approach, process, or methodology to follow. In the absence of any explicit guidance relating to the assessment of health and wellbeing in EIA, recognised Health Impact Assessment (HIA) guidance has been applied. This has been combined with the regulatory requirements defined for EIA to investigate, inform, assess, and more effectively communicate how and where all health issues and opportunities are addressed.
- 1.2.26 This approach is consistent with legislative requirements and supportive of broader government strategy regarding the importance of integrating public health into the planning process.
- 1.2.27 The health and wellbeing assessment has been undertaken in accordance with the following HIA guidance documents:
- West Midlands Public Health Observatory: A Critical Guide to HIA (Ref. 1.14).
 - Wales Health Impact Assessment Support Unit (WHIASU) Health Impact Assessment: A practical guide (Ref. 1.15).
 - Fair Society, Healthy Lives: The Marmot Review. Strategic review of health inequalities in England post-2010 (Ref. 1.16).
 - Healthy Lives, Healthy People: Our strategy for public health in England (Ref. 1.17).
 - Planning Policy Guidance: Healthy and safe communities (Ref. 1.18).
 - Reuniting Health with Planning - Healthier Homes, Healthier Communities (Ref. 1.19).

1.3 Methodology

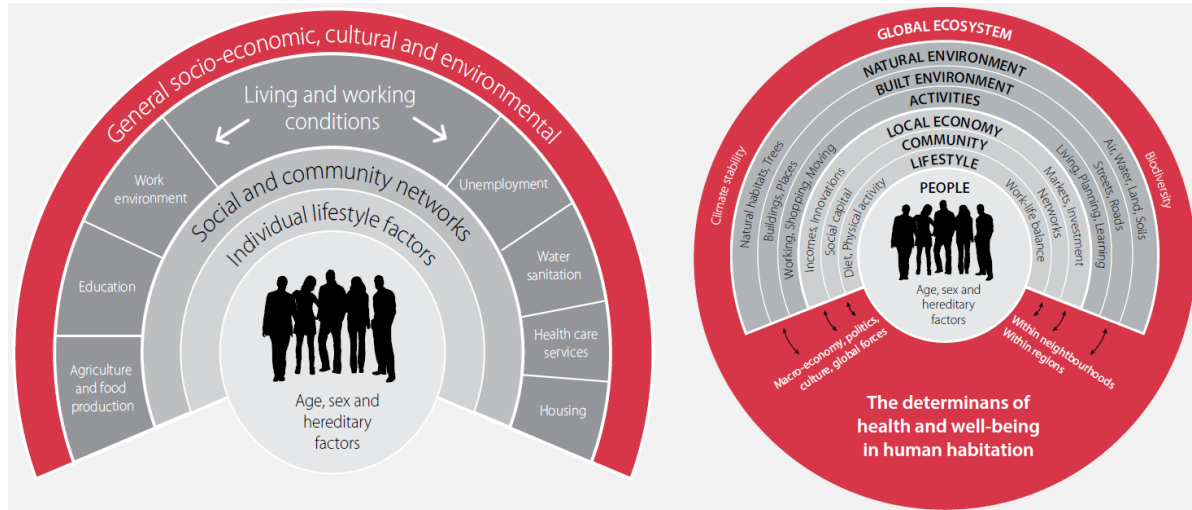
- 1.3.1 The generic EIA methodology is described in **Chapter 6 of Volume 1** of the **ES**. This section sets out the full health and wellbeing assessment methodology.

a) Scope of the assessment

- 1.3.2 The scope of the assessment considers the impacts of the construction, operation and removal and reinstatement phases, where relevant, of the Sizewell C Project.

- 1.3.3** The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019 (see **Appendix 6A** of this volume.)
- 1.3.4** Comments raised in the EIA Scoping Opinions received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A to 6C** of this volume.
- 1.3.5** The health and wellbeing assessment applies a broad socio-economic model of health that encompasses conventional health impacts determined by environmental factors such as disease, accidents, and risk, along with wider socio-economic health determinants vital to achieving good health and wellbeing, such as employment. It considers both physical and mental health, and interfaces with the **Equality Statement** (Doc Ref. 5.14) to consider both population level effects and any disproportionate risk to sensitive community groups.
- 1.3.6** The assessment is therefore based on both social and environmental determinants of health, as illustrated in **Plate 1.1**.

Plate 1.1: Social and environmental determinants of health



Source: Reproduced from Ref 1.20, citing Ref 1.21 and Ref 1.22

- 1.3.7** The assessment follows a source-pathway-receptor approach to identify and assess health impacts that are plausible and attributable to the proposed development. As shown in **Table 1.4**, a hazard source in itself does not constitute a health risk: it is only when there is a hazard source, a receptor and a pathway of exposure between the two that there is any potential for risk to health. Where a source-pathway-receptor linkage exists,

it is then the nature of the specific hazard source, the magnitude of impact via the pathway and the sensitivity of the receptor that will determine what level of health risk is predicted.

Table 1.4: Example of source pathway-receptor model for health effects

Hazard Source.	Pathway	Receptor	Plausible Health Impact.	Explanation
×	✓	✓	No	There is not a clear source from where a potential health impact could originate.
✓	×	✓	No	The source of a potential health impact lacks a means of transmission to a population.
✓	✓	×	No	Receptors that would be sensitive or vulnerable to the health impact are not present.
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect; health impacts should be assessed (describing what effect will occur and its likelihood) and likely health effects are then evaluated for significance.

1.3.8 **Table 1.5** summarises the health and wellbeing determinants (i.e. aspects with the potential to influence health, both adversely and beneficially) assessed. Inter-dependencies between the health and wellbeing assessment and other topic chapters exist where a health determinant constitutes its own technical discipline.

Table 1.5: Summary of Health and Wellbeing assessment scope

Health and Wellbeing Determinant	Determinant Type	Potential Impact	Distribution
Construction of the Proposed Development			
Changes to local air quality (including potential dust nuisance)	Environment	Adverse	Local
Changes in noise exposure	Environment	Adverse	Local
Changes in local transport and flow rates	Environment	Adverse	Local/regional
Direct, indirect and induced employment opportunities	Socio-economic	Beneficial	Local/regional
Changes to local population structure and impact on community facilities and healthcare capacity due to the introduction of a temporary construction workforce	Social	Beneficial and/or adverse	Local
Increase in exposure to and use of	Social	Adverse	Local

Health and Wellbeing Determinant	Determinant Type	Potential Impact	Distribution
lifestyle risk factors (e.g. drugs, alcohol, sexual health, communicable disease) due to the presence of a temporary construction workforce			
Operation of the Proposed Development			
Changes to local air quality (from plant operation and traffic)	Environment	Adverse	Local
Changes in noise exposure (from plant operation (e.g. CHP) and traffic)	Environment	Adverse	Local
Potential changes in exposure to radiation and radioactive materials	Environment	Neutral	Local
Changes in local transport and flow rates	Environment	Adverse	Local
Direct, indirect and induced income employment opportunities	Economic	Beneficial	Local/regional
Changes to local population structure and impact on community facilities and healthcare capacity due to the introduction of a permanent operational workforce	Social	Beneficial and/or adverse	Local

b) Consultation

- 1.3.9** The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process.
- 1.3.10** As detailed in the EIA Scoping Opinion received in 2014, the methodology for assessing health and wellbeing “*should be agreed with the relevant statutory consultees*”. To facilitate this, and further address potential public health concerns, the Sizewell C Health Working Group was established. Membership currently includes Suffolk County Council (SCC), East Suffolk Council (ESC), Public Health Suffolk; Suffolk National Health Service (NHS); Suffolk, Ipswich, East Suffolk, and Great Yarmouth and Waveney Clinical Commissioning Groups (CCGs). This has provided a collaborative platform to explore, discuss, and iteratively inform the health and wellbeing assessment undertaken, while informing the development of features and initiatives relevant to supporting local health needs, objectives and priorities.

1.3.11 A summary of the most recent comments raised during consultation with the Sizewell C Health Working Group is summarised in **Table 1.6**. These have informed the scope and methodology of the health and wellbeing assessment, as well as design features and mitigation to address changes in local healthcare demand, enabling the assessment to better align with the delivery of local healthcare and health promotion objectives. The core focus of the ongoing engagement has centred on managing public health needs from the introduction of the non-home-based workforce to the area.

Table 1.6: Summary of consultation responses that have informed the scope and methodology of the health and wellbeing assessment

Consultee	Date	Comment	SZC Co. Response
Sizewell C Health Working Group	29.01.19	Out of hours service (OOH) – What will be the OOH service offered on-site to workers?	An on-site occupational health service will operate 24/7, including an OOH service appropriate to the size of the workforce.
Sizewell C Health Working Group	29.01.19	There will be a need to ensure that the medical provision at Sizewell is incorporated within the knowledge base for the 111 service to enable 111 to signpost the temporary workforce to access SZC Co. medical facilities where appropriate.	To be implemented within the occupational health service provision, and monitored with key health stakeholders through the formation of the Sizewell C Health Working Group (subject to consent).
Sizewell C Health Working Group	29.01.19	Concern regarding traffic impacts during construction phase for business as usual activities across East Suffolk and Waveney e.g. patient transport.	SZC Co. reported back on forecast journey times at peak from Ipswich / James Paget hospitals to site and these showed minimal changes in travel times predicted.
Sizewell C Health Working Group	29.01.19	Community pharmacy – influx of non-home-based workers may lead to an increase in demand at pharmacies. Although private businesses there could be a need for ongoing Sizewell C Health Working Group engagement with both Sizewell on-site occupational health service and local pharmacies to ensure sufficient access to medications.	The terms of reference for the Sizewell C Health Working Group will be modified to facilitate ongoing engagement. The occupational health service will include a pharmacy, thereby internalising and addressing additional demand from non-home-based workers, while providing complimentary care for home-based workers if desired.
Sizewell C Health Working Group	29.01.19	What health services are SZC Co. planning to provide on-site and how will these interact with local services?	The scope of the occupational health service is set out in Health Technical Note 1, provided in Volume 2, Appendix 28A of the ES and will form the basis of the specification for

Consultee	Date	Comment	SZC Co. Response
			tenders. The scope and focus of the final provision will be discussed with the Sizewell C Health Working Group, as will monitoring to ensure the provision remains appropriate, effective and aligns with local health protection and promotion campaigns.
Sizewell C Health Working Group	29.01.19	Roundabout construction in Yoxford near Yoxford Surgery - SZC Co. to clarify construction approach - will this be offline - what is likely disruption?	Construction is estimated to take up to nine months, beginning in the early years of Sizewell C construction. This would be largely offline, but traffic management would be required during construction of the tie-ins back to the A12 and B1122 once the roundabout is constructed. This would likely be shuttle working under traffic light control, with each tie in anticipated to take around two weeks. Volume 7, Chapter 2 of the ES provides further detail on the Yoxford roundabout.
Sizewell C Health Working Group	29.01.19	Query as to Section 106 mitigation for any residual impact on primary care.	The primary objective is to design out impacts upon local primary care; to then absorb and internalise any additional demand directly attributable to the proposed development (through the occupational health care provision including GP and pharmacy for the non-home-based workforce), and to then address any residual impact through an appropriate health care planning contribution.
Sizewell C Health Working Group	29.01.19	Changes to local air quality - will there be ongoing monitoring of Air Quality via sampling for PM _{2.5} , NO _x ?	Changes in local air quality are assessed against air quality objectives set out in legislation for the protection of human health within Volume 2, Chapter 12 and Volumes 3 to 9, Chapter 5 of the ES and further assessed in terms of relative risk to health within this chapter. Where appropriate, environmental monitoring will be established, as described within the air quality assessment chapters.
Sizewell C Health Working Group	29.01.19	Changes to local noise quality?	Changes in noise exposure are assessed against objective thresholds set to be protective of health in Volume 2, Chapter 11 and Volumes 3 to 9, Chapter 4 of the ES

Consultee	Date	Comment	SZC Co. Response
			and further assessed in health terms in this chapter.
Sizewell C Health Working Group	29.01.19	Ensure measures to address and mitigate any drug and alcohol misuse.	The potential social impact from the introduction of a temporary non-home-based workforce is addressed through various measures including the Community Safety Management Plan (Doc Ref. 8.16), the Accommodation Strategy (Doc Ref. 8.10) and through mandatory drug and alcohol testing of workers. Further information is provided in Volume 2, Chapter 9 of the ES .
Sizewell C Health Working Group	29.01.19	Promotion of good sexual health and prevention of sexually transmitted infections and unplanned pregnancies: SZC Co. to provide more detail on how they will mitigate any probable impacts.	As detailed in Volume 2, Appendix 28B of the ES , the occupational health provision will include a range of health protection and promotion initiatives and campaigns. The scope and focus of the final provision will be discussed with the Sizewell C Health Working Group, as will monitoring to ensure the provision remains appropriate, effective and aligns with local health protection and promotion campaigns.
Sizewell C Health Working Group	29.01.19	Promotion of healthy lifestyles and workplace health promotion.	
Sizewell C Health Working Group	29.01.19	0-19 service: extra family support will be vital for incoming workforce and local residents; screening and immunisation teams will have increased demands.	The number of potential dependants have been assessed within the socio-economic and health and wellbeing assessment, and the net additionality and associated change in health care demand is not anticipated to be significant (as dependents are expected to occupy existing housing and take the place of former residents). Although not considered a significant impact, it is recognised that the NHS and front-line health care services continue to run to austerity measures, and are increasingly under pressure from a growing and aging population. On this basis, the potential increase in demand attributable to net additional dependants has been forecast, and a supporting contribution would be provided until NHS funding can adjust. Volume 2, Appendix 28B of the ES sets out further detail.

c) Study area

- 1.3.12 The study area for the health and wellbeing baseline comprises the local authority district of East Suffolk (previously Suffolk Coastal and Waveney) which immediately surrounds the proposed development. This geographic scope is considered appropriate on the basis that districts are the smallest geographic level for which up-to-date publicly available baseline health statistics are available. Some of the baseline data has been used within calculations where quantitative assessment methods are to be applied.
- 1.3.13 The study area for each of the health and wellbeing determinants to be assessed varies, as they remain consistent with the relevant study areas used within the technical topic assessments to which they relate. As an example, the receptors which make up the study area for assessing the potential effects on health and wellbeing from noise will not necessarily be the same receptors which make up the study area for assessing the potential effects on health and wellbeing from air quality or socio-economic changes (as the distribution and exposure may vary).

d) Assessment scenarios

- 1.3.14 As the health and wellbeing chapter (**Chapter 28**, of **Volume 2** of the **ES**) draws from and builds upon key outputs from inter-related technical disciplines, the assessment scenarios and temporal scope of the health and wellbeing chapter remain consistent with the technical disciplines from which it draws upon.

e) Assessment criteria

- 1.3.15 As described in **Volume 1, Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the Sizewell C Project would have an effect on any resources or receptors. Assessments broadly consider the magnitude of impacts and value/sensitivity of resources/receptors that could be affected in order to classify effects.
- 1.3.16 The assessment criteria used in the health and wellbeing assessment is presented in the following sub-sections.

i. Value and sensitivity

- 1.3.17 Within a defined population, individuals will range in level of sensitivity that can further vary by individual health pathway. As such, it is not possible to allocate a fair or accurate sensitivity classification to a population uniformly for every health determinant. On this basis, while the health baseline provides context to inform the refinement of the Sizewell C Project and further inform mitigation and bespoke community and health support

initiatives, a precautionary approach has been applied to the final assessment of significance by assuming that the population within the study area are of uniformly high sensitivity to the particular health pathway being assessed. Equally, given the importance of healthcare services, coupled with existing capacity and revenue challenges, all healthcare services are considered high value and uniformly sensitive to change.

- 1.3.18 This precautionary approach thereby provides a means to account for pockets of inequality that exist within all communities, and further stresses the sensitivity of healthcare systems within the study area.

ii. Magnitude

- 1.3.19 The criteria for the assessment of magnitude are shown in **Table 1.7**, and are justified by the supporting assessment for each health pathway.

Table 1.7: Assessment of magnitude of impact on health and wellbeing

Magnitude	Criteria
High	Change in environmental or socio-economic factor sufficient to result in a major change in baseline population health or socio-economic circumstance (adverse or beneficial).
Medium	Change in environmental and socio-economic factor sufficient to result in a moderate change in baseline population health or socio-economic circumstance (adverse or beneficial).
Low	Change in environmental and socio-economic factor sufficient to result in a minor change in baseline population health or socio-economic circumstance (adverse or beneficial).
Very Low	Change in environmental and socio-economic factor below which it is possible to result in any manifest health outcome at a population level but may impact at an individual level (adverse or beneficial).

iii. Effect definitions

- 1.3.20 The definitions of effect for health and wellbeing are shown in **Table 1.8**.

Table 1.8: Classification of effects

		Value / Sensitivity of receptors and resources
		High
Magnitude	Very Low	Negligible
	Low	Minor
	Medium	Moderate

	Value / Sensitivity of receptors and resources
High	Major

1.3.21 Following the classification of an effect as presented in **Table 1.8**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

f) [Assessment methodology](#)

i. [Establishing the baseline](#)

[Existing baseline](#)

1.3.22 Information relating to existing health and socio-economic circumstance within the study area was collated and iteratively updated through a detailed review of third-party data, available online. Data sources comprise:

- Office for National Statistics;
- Department for Communities and Local Government;
- NHS Digital;
- UK Crime Statistics;
- Public Health England Local Health Statistics; and
- Hospital Episode Statistics.

1.3.23 Any environmental baseline conditions required to provide context for the completion of the health and wellbeing assessment have been informed by the relevant technical assessments (namely: air quality; noise and vibration; traffic and transport; socio-economics; and radiological assessment).

[Future baseline](#)

1.3.24 As it is challenging to predict the future health and wellbeing baseline with high confidence, trends are analysed as part of the current baseline to provide insight into likely future local community circumstance. For the purpose of the health and wellbeing assessment, and given the improving trends, the present-day baseline health and wellbeing data have been applied.

ii. Construction of the proposed development

1.3.25 The assessment of the construction phase of the Sizewell C Project, includes:

- The main development site, including:
 - construction of the main development site (including the introduction of the non-home-based workforce);
 - road and rail traffic associated with the main development site construction; and
 - removal and reinstatement of the temporary construction area and Land East of Eastlands Industrial Estate (LEEIE).
- Construction, operation and removal/reinstatement of the temporary associated developments, including:
 - northern park and ride at Darsham;
 - southern park and ride at Wickham Market;
 - green rail route; and
 - freight management facility.
- Construction of the permanent associated developments and their operation during the construction phase for the power station, including:
 - two village bypass;
 - Sizewell link road;
 - Yoxford and other highway improvements; and
 - rail improvement works.

1.3.26 Health determinants associated with the construction of the Sizewell C Project which are considered in this assessment include:

- potential health and wellbeing effects from changes in emissions to air;
- potential health and wellbeing effects from additional transport movements;
- potential health and wellbeing effects from changes in noise exposure;
- potential health and wellbeing effects associated with the introduction of a temporary non-home-based construction workforce (including

social impacts and on healthcare capacity) including net additional dependants;

- potential health and wellbeing benefits associated with socio-economic factors (such as direct, indirect and induced employment); and
- general stress and anxiety impacting upon quality of life and wellbeing.

iii. Operation of the Proposed Development

1.3.27 This section of the assessment covers the commissioning and operation phase of the main development site, comprising:

- commissioning and operation of the main development site (the power station). The operational life of the Sizewell C Project is assumed to be 60 years.
- operation of the following permanent associated developments during the commissioning and operational phase of the power station:
 - two village bypass;
 - Sizewell link road; and
 - Yoxford and other highway improvements.

1.3.28 Health determinants associated with the operation phase considered in this assessment include:

- potential health and wellbeing effects from changes in radiological exposure;
- potential health and wellbeing effects from changes in electromagnetic field exposure;
- potential health and wellbeing effects from changes in emissions to air;
- potential health and wellbeing effects from additional transport movements;
- potential health and wellbeing effects from changes in noise exposure;
- potential health and wellbeing benefits associated with socio-economic factors (such as direct, indirect and induced employment); and

- general stress and anxiety impacting upon quality of life and wellbeing.

iv. Inter-relationships

1.3.29 There are several inter-relationships between the health and wellbeing chapter and other technical assessments, namely: air quality; noise and vibration; traffic and transport; socio-economics; and radiological assessment.

1.3.30 A summary of these inter-relationships is provided below:

- Health and air quality – there is a linear relationship between exposure to air pollutants and attributed health outcomes such as hospital admission/mortality rate from respiratory and cardiovascular diseases. The health and wellbeing assessment draws from and builds upon the air quality dispersion modelling to investigate the potential significance of any change in community exposure, and the consequence to health, if any.
- Health and noise or vibration – there is a complex relationship between noise/vibration and attributed health outcomes such as hospital admission/mortality rate from cardiovascular disease and mental health conditions (e.g. depression, anxiety, and dementia). Noise/vibration can affect health both directly (in extreme circumstances – less common), and indirectly (through annoyance or sleep disturbance). However, the health effects from noise/vibration can also be affected by tonality and type of noise (e.g. low frequency noise, infrasound, and amplitude modulation). The health and wellbeing assessment draws from and builds upon the noise modelling to investigate the potential significance of any change in community exposure, and the consequence to health, if any.
- Health and traffic/transport – changes in transport nature and frequency have the potential to modify risk and influence health. The health and wellbeing assessment draws from and builds upon the transport modelling to investigate the potential significance of any change in community safety, and the consequence to health, if any.
- Health and socio-economic factors – good quality, stable employment is one of the most important determinants of good health and wellbeing. Employment provides a stable income which can be used to influence a range of lifestyle factors which impact health. Education and training paves the way to gaining good quality, stable employment. The health and wellbeing assessment draws from and builds upon the construction workforce forecast and socio-economic

assessment to investigate the potential significance of any change in income and employment, and the consequence to health, if any.

- Health and radiation – the potential health impacts associated with exposure to ionising radiation is dependent on the type of radiation and sensitivity of different tissues and organs. The health and wellbeing assessment draws from and builds upon the radiological assessment to further investigate and communicate the potential significance of any consequence to health, if any.

g) **Assumptions and limitations**

- 1.3.31 As the health and wellbeing assessment (**Chapter 28**, of **Volume 2** of the **ES**) draws from and builds upon key outputs from a number of inter-related technical chapters, the limitations of these assessments also apply to any information used in this assessment. It is however, considered that the information available provides a suitable basis for a robust assessment of health and wellbeing for EIA purposes.

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