



The Sizewell C Project

5.10 Shadow Habitats Regulations Assessment Volume 2: Stage 3 Assessment of Alternative Solutions

Revision: 1.0
Applicable Regulation: Regulation 5(2)(g)
PINS Reference Number: EN010012

May 2020

Planning Act 2008
Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009



Contents

1	Introduction.....	1
1.1	Purpose and scope of assessment.....	1
1.2	The Sizewell C Project.....	1
1.3	Assessment scenarios used for the construction phase noise assessment	9
1.4	Report structure.....	10
2	Method.....	12
2.2	Step 1 – Identify the need for the Sizewell C Project and define the objectives	13
2.3	Step 2 – Identify the potential harm the Sizewell C Project is predicted to cause to the integrity of the SPA and Ramsar site	14
2.4	Step 3 – Produce a long list of potential alternative solutions to address the potential harm and screen these to produce a short list	15
2.5	Step 4 – Consider whether any short listed potential alternative solutions are ‘feasible’ alternative solutions	16
2.6	Step 5 – Consider whether any feasible alternative solutions would have a lesser effect on the integrity of the SPA and Ramsar site.....	17
3	Step 1 – Sizewell C Project Need and Objectives	18
3.1	Introduction.....	18
3.2	The need for the Sizewell C Project	18
3.3	The Sizewell C Project objectives.....	19
3.4	Use of Sizewell C Project need and objectives in this assessment	19
4	Step 2 – Assessed Potential for Harm.....	31
4.1	Introduction.....	31
4.2	What is the assessed potential for harm?	31
4.3	Sizewell C Project works associated with noise and visual disturbance	33
4.4	What are the proposed mitigation measures?	34
4.5	What is the residual potential for harm?	35
5	Step 3 – Producing a Long List of Potential Alternative Solutions	36
5.1	Introduction.....	36
5.2	Long list of potential alternative solutions	36
5.3	Screening the long list of potential alternative solutions	48
5.4	Short list of alternative options.....	71

6	Step 4 – Are There Any Feasible Alternative Solutions	72
6.1	Introduction.....	72
7	Step 5 – Are There Any Feasible Alternative Solutions That Have A Lesser Effect On The Integrity Of Any European Designated Site?	76
7.1	Introduction.....	76
7.2	Step 5 assessment	76
8	Conclusion.....	77
	References	78

Tables

Table 3.1: Overview of Sizewell C Project objectives	21
Table 5.1: Long list of potential alternative solutions	37
Table 5.2: Screening the long list of potential alternative solutions.....	49
Table 6.1: Step 4: assessing the feasibility of short-listed options.....	73

Plates

Plate 1.1: Indicative construction timeline.....	6
--	---

Appendices

Appendix A: Key noise contour plots	
-------------------------------------	--

1 Introduction

1.1 Purpose and scope of assessment

1.1.1 This report presents SZC Co.'s 'assessment of alternative solutions' for the Sizewell C Project. This represents Stage 3 of SZC Co.'s Shadow Habitats Regulations Assessment (Shadow HRA) process and identifies whether or not there are any 'alternative solutions' to the Sizewell C Project proposals in the context of The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (Ref. 1.1). Further details of the HRA process are provided in **Chapter 3** of the **Shadow HRA Assessment Report** (Doc Ref. 5.10).

1.1.2 The relationship between the various documents that comprise SZC Co.'s HRA process is as follows:

- **Shadow HRA Report, Volume 1:** Stages 1 and 2 – Screening and Appropriate Assessment (Doc Ref. 5.10).
- **Shadow HRA Report, Volume 2:** Stage 3 – Assessment of Alternative Solutions (Doc Ref. 5.10) (this document).
- **Shadow HRA Report, Volume 3:** Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI) (Doc Ref. 5.10).
- **Shadow HRA Report, Volume 4:** Compensatory Measures (Doc Ref. 5.10).

1.1.3 This report focusses on those project activities for which SZC Co.'s Stage 2 **Shadow HRA Report** (Doc Ref. 5.10) has concluded an adverse effect on site integrity cannot be ruled out. This is limited to those activities that would cause noise and visual disturbance to the breeding marsh harrier population (affecting their ability to forage) within the Minsmere-Walberswick Special Protection Area (SPA) and Ramsar site during the construction phase for the main development site only. Further detail regarding construction on the main development site is provided in **Chapter 3, Volume 2** of the **ES** (Doc Ref. 6.3).

1.2 The Sizewell C Project

1.2.1 For ease of reference, text from **Chapter 2** of the **Shadow HRA Report** (Doc Ref. 5.10) is reproduced below to describe the Sizewell C Project.

1.2.2 The Sizewell C Project consists of a number of elements, as follows:

Nuclear islands

- Two nuclear islands, including two United Kingdom (UK) European Pressurised Reactors™ (EPR™) reactor buildings and associated annexed buildings containing the safety systems, fuel handling systems and access facilities, together with the adjacent emergency diesel generator buildings.

Conventional islands

- Two conventional islands, each including a turbine hall and associated electrical buildings for the export and distribution of electrical power.

Operational building

- An operational service centre (a multi-purpose building), which allows for access into the nuclear islands, including storage areas, workshops, store rooms, laboratories, data centre, offices and associated support and welfare facilities, including the staff restaurant.

Cooling water pumphouses and associated buildings

- Two cooling water pumphouses with related infrastructure (one for each UK EPR™ reactor).

Ancillary buildings

- Plant, office/access, storage and fuel and waste management.
- National Grid 400 kilovolt (kV) substation, alterations to the existing National Grid substation and associated diversion of overhead lines.
- Relocation of several Sizewell B buildings including the outage store, training centre; administrative buildings; visitor centre; and, office, canteen and welfare facilities.
- Associated buildings, structures and plant outside of the power station perimeter.

Marine works and associated infrastructure

- The cooling water system and combined drainage outfall in the North Sea.

Other site structures, infrastructure and works, including highway works and earthworks

- Overhead power lines and pylons connecting the conventional islands to the National Grid substation.
- Replacement of an existing National Grid pylon and power line south of Sizewell C.
- A vehicular and pedestrian crossing over the Sizewell Marshes Site of Special Scientific Interest (SSSI) south of Goose Hill in the form of a culverted embankment.
- A beach landing facility (BLF) proposed for freight and abnormal indivisible loads (AILs) arriving by sea.
- Relocation of certain Sizewell B infrastructure, including: outage laydown area; up to 112 replacement car parking spaces; access roads; up to 576 outage car parking space; and, outage car park access roads.
- Diversion of rights of way, including Bridleway 19.
- The power station access road, linking the SSSI crossing with a new roundabout onto Abbey Road (B1122).
- Up to 770 operational car parking spaces and up to 600 outage car parking spaces.
- Realignment of Lover's Lane and Eastbridge Road.
- Realignment of the junction of the B1122 Abbey Road and Lover's Lane.
- Replacement vehicular access from Valley Road to adjoining farmland to the north.
- Flood defences and coastal protection measures.
- Onshore components of the marine infrastructure.
- Water supply and drainage measures, including realignment of Sizewell Drain.
- Landscape restoration works and planting.
- Fencing, lighting and other security provisions.
- Additional parking spaces at Kenton Hills car park.

Temporary construction area

- The area located primarily to the north and west of the proposed Sizewell Marshes SSSI crossing, which would support construction activity on the main power station platform.

Land East of Eastlands Industrial Estate (LEEIE)

- The area to the north of Sizewell Halt, which would be used to support construction of the main power station platform and temporary construction area.

Additional facilities associated with the Sizewell C Project

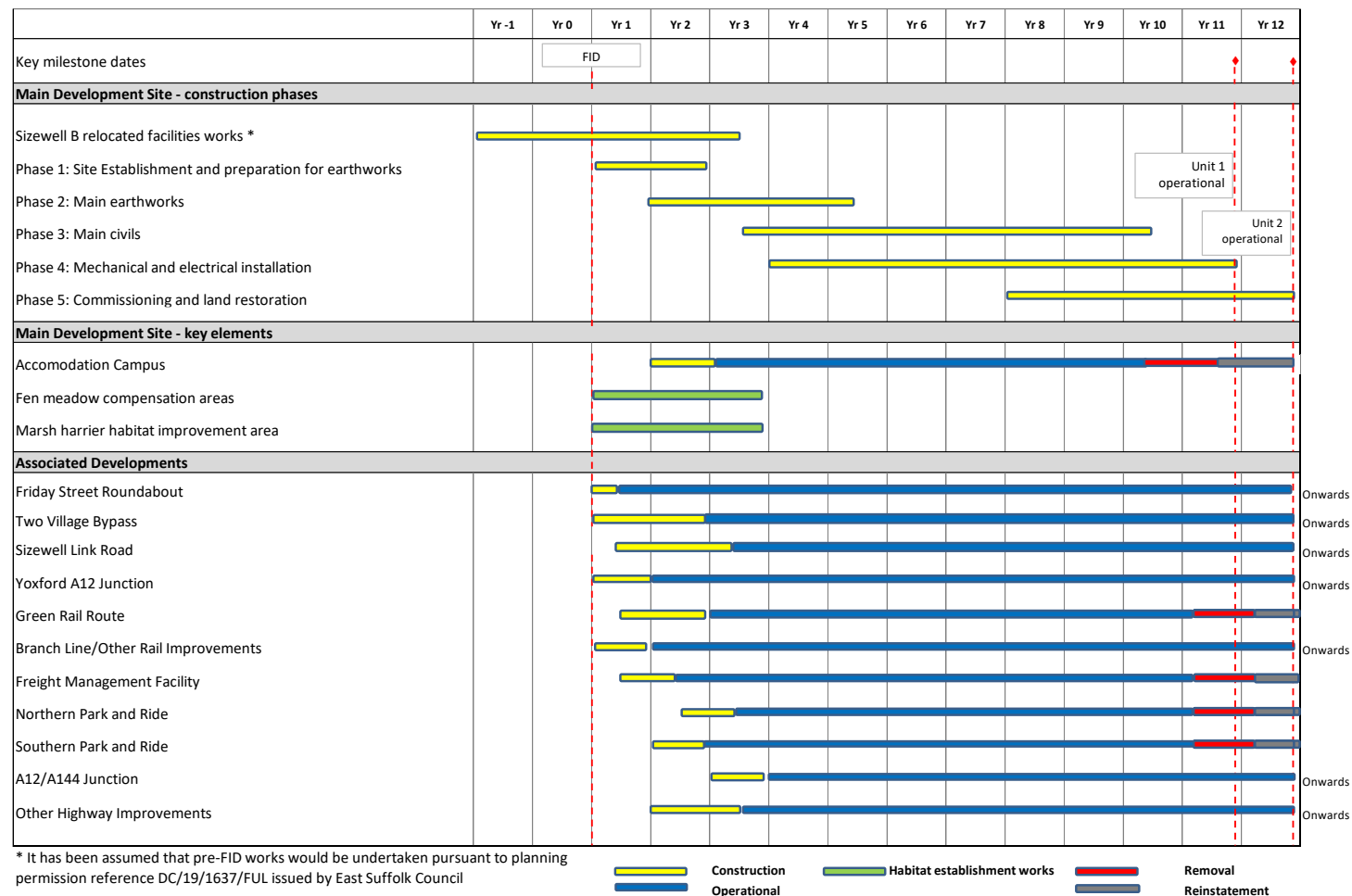
- A marsh harrier habitat improvement area at Westleton (if required) .
- Fen meadow compensation land to the south of Benhall and to the east of Halesworth.
- Off-site sports facilities at Leiston.

Associated development

- Two temporary park and ride facilities.
- Permanent road improvements to the A12 including a bypass around the villages of Farnham and Stratford St Andrews (the two village bypass).
- A road linking the A12 with the B1122 (the Sizewell link road).
- A new roundabout to replace the existing priority junction at the A12/Yoxford junction.
- A temporary freight management facility at Seven Hills near the A12/A14 junction.
- A temporary extension of the existing Saxmundham to Leiston branch line into the temporary construction area and other permanent rail improvements on this line.
- A temporary worker's accommodation campus on the main development site.

- 1.2.3 Construction work for the main platform is expected to fall into the following five main phases, as detailed on **Figure 3.4** to **Figure 3.8** in **Chapter 3, Volume 2** of the **ES** (Doc Ref. 6.3). Works associated with Sizewell B relocated facilities are assumed to start pursuant to planning permission granted by East Suffolk Council (application ref. DC/19/1637/FUL) two years prior to the start of works pursuant to the DCO. The indicative construction timeline for the main development site works, along with the construction timeline for the associated development, is provided in **Plate 1.1**.

Plate 1.1: Indicative construction timeline



Phase 1 – Site establishment and preparation for earthworks.

- 1.2.4 Enabling works would take place prior to formal site establishment, including archaeological and protected species mitigation works (translocation of species such as reptiles and water voles, and related local habitat removal).
- 1.2.5 Construction work would then begin by securing the site through installation of fencing and site clearance, demolition of above and below ground structures and buildings and diversion of existing utilities as necessary.
- 1.2.6 Acoustic fences and earth bunds would be used, where necessary, to attenuate noise levels. Earth bunds would be grassed/seeded. Contractor compounds would be erected including welfare and office accommodation. Storage and handling areas, facilities for and equipment for processing of excavated materials and other temporary facilities, plant, cranes and machinery would also be provided.
- 1.2.7 The Sizewell drain would be realigned to pass along the western edge of the main platform and connect to the Leiston drain to the north. Water control features would be installed in the new drain to enable manipulation of the water levels within Sizewell Marshes SSSI.
- 1.2.8 The cut-off wall platform would be constructed around the perimeter of the location of the cut-off wall and would include a perimeter access corridor. There would be a retaining slope from the platform to the newly aligned Sizewell drain.
- 1.2.9 A crossing would be constructed over Sizewell Marshes SSSI. This would comprise an embankment and culvert, with the culvert of sufficient dimensions to leave the bank and channel of the Leiston drain intact.
- 1.2.10 A haul road would provide a dedicated route for heavy earthmoving plant from the main platform to the temporary construction area stockpiles. A segregated route would be provided for general site traffic.
- 1.2.11 Construction of the coastal defence structures would commence in this phase.

Phase 2 – main development site earthworks and completion of temporary infrastructure.

- 1.2.12 Earthworks would commence alongside dewatering of the area within the cut-off wall area. Existing made ground and granular materials would be removed and transported to the stockpile areas within the temporary construction area.

- 1.2.13 Temporary facilities, plant, cranes, machinery and other temporary works would be required.
- 1.2.14 Work would commence to construct the marine launch chambers and bore the intake and outfall tunnels from within the main platform.
- 1.2.15 The BLF would be constructed, consisting of a piled platform, fenders (located at the seaward end), a ramp and mooring dolphins. Piling for dolphins would be carried out from a jack leg rig or barge. Localised dredging will be necessary prior to piling.

Phase 3 – Main civils.

- 1.2.16 The nuclear island buildings would be constructed with reinforced concrete. The concrete would be mixed using on-site batching plants in the temporary construction area.
- 1.2.17 The reactor building incorporates a steel liner which forms the inner shell of the building. Sections of the liner would be pre-fabricated within either the main platform or the temporary construction area and craned into position.
- 1.2.18 Concrete buildings within the conventional island would be constructed using similar methods to the nuclear island buildings.
- 1.2.19 Construction of pylons within the main platform would generally follow the same construction methodology as described below for National Grid pylons.
- 1.2.20 Temporary facilities, plant, cranes, machinery and other temporary works would be required.

Phase 4 – Mechanical and electrical installation.

- 1.2.21 Approximately 180 mechanical and electrical plant items (e.g. the reactor pressure vessels) would be AILs and may be shipped to the BLF during this phase.
- 1.2.22 The majority of mechanical and electrical activity would take place within the power station buildings.
- 1.2.23 Temporary facilities, plant, cranes, machinery and other temporary works would be required.
- 1.2.24 During Phase 4, the western part of the permanent sea defences would be constructed, involving the raising of the construction phase sea defence. This would be followed by the implementation of a landscape scheme to

soften the visual appearance through planting and varying the backfilled height.

Phase 5 – Commissioning and land restoration.

- 1.2.25 Following completion of the works described above, temporary facilities on the main platform would be removed and the final surfacing would be undertaken as part of on-site hard landscaping.

1.3 Assessment scenarios used for the construction phase noise assessment

- 1.3.1 Initial predictions of noise from construction activities associated with the five main phases of construction were undertaken to determine relevant assessment scenarios for use within the construction phase noise assessment, as provided in **Appendix 11B** of **Volume 2** of the **ES** (Doc 6.3). These scenarios predicted that the highest noise levels are likely to occur for a relatively short period at the very start of construction, before dropping off slightly for the rest of Phase 1 and 2, then reducing again significantly for most of the construction during Phases 3 and 4. Initial predictions for Phase 5 indicated that the highest noise levels during Phase 5 are likely to be similar to Phase 1. Taking this into account, the following assessment scenarios were adopted for the daytime main development site construction noise assessment¹:

- Phase 1a: initial site stripping/levelling and concurrent noisy activities. Based on a typical day in the busiest month of activity and presented as dB LAeq, 0700–2300hrs.
- Phase 1b/2: construction of site infrastructure and earth moving. These works may span more than three years and the levels assessed are the predicted average for the period, presented as dB LAeq, 0700–2300hrs.
- Phase 3/4: construction of above ground power station buildings. These works may span more than eight years and the levels assessed are the predicted average for the period, presented as dB LAeq, 0700–2300hrs.
- Phase 5: land restoration and removal of temporary facilities. These works may be ongoing for around two years and the levels assessed are the predicted average for the period, presented as dB LAeq, 0700–2300hrs.

¹ Construction activities at the main development site would be limited during the night-time period so noise levels would be considerably lower than those generated during the daytime.

- 1.3.2 **Appendix 11B** of **Volume 2** of the **ES** provides detail of the construction plant and activities included within the main development site noise model. The list of construction activities that were included in the noise model for each of the above phases of construction has been used as the basis for the consideration of possible alternative solutions for each activity (given that these are the key activities to be undertaken during the construction phase and which have the potential to give rise to noise and visual disturbance).
- 1.4 **Report structure**
- 1.4.1 **Section 1** introduces the purpose and scope of this report. It also provides an outline description of the Sizewell C Project.
- 1.4.2 **Section 2** sets out the methodology adopted by SZC Co. for the assessment of alternative solutions.
- 1.4.3 **Section 3** provides details of the Sizewell C Project need and defines its objectives.
- 1.4.4 **Section 4** describes the Sizewell C Project works where it has not been possible to conclude no adverse effect on the integrity of the Minsmere-Walberswick SPA and Ramsar site. It summarises particular aspects of the Sizewell C Project works that relate to the envisaged potential for harm and presents the proposed mitigation for the potential harm.
- 1.4.5 **Section 5** produces a long list of potential alternative solutions to address the potential harm. The long list is screened to define a short list of options that would fulfil the Sizewell C Project need (in line with national policy and guidance) and Sizewell C Project objectives.
- 1.4.6 **Section 6** considers whether any short-listed potential alternative solutions are ‘feasible’.
- 1.4.7 **Section 7** indicates whether any feasible alternative solutions would have a lesser effect on the integrity of the Minsmere-Walberswick SPA and Ramsar site.
- 1.4.8 **Section 8** sets out the conclusions of the Stage 3 Assessment of Alternative Solutions.
- 1.4.9 **Section 9** provides details of the references used.

- 1.4.10 **Appendix A** of this assessment presents relevant noise contour plots from the construction phase noise assessment, as provided in **Appendix 11B** of **Volume 2** of the **ES**.

2 Method

2.1.1 The methodology adopted to assess alternative solutions has been developed based on guidance from a range of sources, including:

- the European Commission's (EC) Assessment of plans and projects significantly affecting Natura 2000 sites, methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (2000) (Ref. 1.2)² ('Methodological Guidance for the Habitats Directive').
- EC's Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (1992) (Ref. 1.3) ('Habitats Directive').
- EC Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2012) (Ref. 1.4) ('EC Guidance').
- EC Guidance Document on Managing Natura 2000 sites, The provisions of Article 6 of the 'Habitats Directive' (2018) (Ref. 1.5) ('EC Guidance').
- Department for Environment, Food and Rural Affairs (Defra) Guidance, Habitats and Wild Birds Directives: guidance on the application of article 6(4) Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures (2012) (Ref 1.6) ('Defra Guidance').
- The Planning Inspectorate's (PINS) Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects (2016) (Ref. 1.7) ('PINS Advice Note 10').
- Tyldesley and Chapman's Habitats Regulations Assessment Handbook (2017) (Ref. 1.8) ('HRA Handbook').
- The European Court of Justice decision and associated Advocate General Kokott opinion set out in C-239/04 (2006) (Ref. 1.9).
- The approach taken in the Able Marine Energy Park Development Consent Order (DCO) application and examination (including the applicant's HRA report, Examining Authority report and the Secretary of States' decision) (2013) (Ref. 1.10).

2.1.2 Of particular note from the above sources is the text contained in paragraph 43 and 44 of Advocate General Kokott in Case C-239/04 *Commission v. Portugal* (Ref. 1.9). This states:

² The guidance has been supplemented by the EC's Managing Natura 2000 sites: *the provisions of Article 6 of the Habitats Directive 92/43/EEC* (2018, "Provisions of Article 6" (Ref 2.10))

“The absence of alternatives cannot be ascertained when only a few alternatives have been examined, but only after all the alternatives have been ruled out. The requirements applicable to the exclusion of alternatives increase the more suitable those alternatives are for achieving the aims of the project without giving rise — beyond reasonable doubt — to manifest and disproportionate adverse effects.

Among the alternatives short-listed in that way, the choice does not inevitably have to be determined by which alternative least adversely affects the site concerned. Instead, the choice requires a balance to be struck between the adverse effect on the integrity of the SPA and the relevant reasons of overriding public interest.”

2.1.3 The methodology, which is consistent with the approach detailed in paragraph 43 and 44 above, consists of five steps, set out below, to establish the presence or absence of alternative solutions³:

- Identify the need for the Sizewell C Project and define its objectives.
- Identify the potential harm the Sizewell C Project is predicted to cause to the integrity of European designated site(s).
- Produce a long list of potential alternative solutions to address the potential harm and screen these to produce a short list.
- Consider whether any short-listed potential alternative solutions are ‘feasible’ alternative solutions.
- Consider whether any feasible alternative solutions would have a lesser effect on the integrity of any European designated site.

2.1.4 Each step is explained below.

2.2 Step 1 – Identify the need for the Sizewell C Project and define the objectives

2.2.1 The need for the Sizewell C Project forms the overarching reason for the DCO application; this is set out in **section 3** of this report.

2.2.2 Defra Guidance (Ref. 1.6), paragraph 14, states:

“National Policy Statements and other documents setting out Government policy (e.g. the UK Renewable Energy Roadmap)

³ Definition of an alternative solution is based on paragraph 4 of page 9 in Methodological Guidance for the Habitats Regulations (Ref. 2.1): “Alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site”.

provide a context for competent authorities considering the scope of alternative solutions they will assess.”

- 2.2.3 In accordance with this, **section 3** of this report also presents an overview of relevant Government policy included within the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 1.11) and the NPS for Nuclear Power Generation (NPS EN-6) (Ref. 1.12). This is used to inform the process of screening the long list of alternative solutions in Step 3.
- 2.2.4 The following guidance explains that it is important to define the Sizewell C Project's objectives in order to determine what constitute relevant alternatives (emphasis added):
- EC Methodological Guidance (Ref. 1.2) (Stage Three: Assessment of Alternative Solutions) sets out the tasks to be carried out in assessing alternatives in "Box 14: How to assess alternative solutions". This includes *"Identify and characterise the key objectives of the project or plan"*.
 - Defra Guidance paragraph 11 (Ref. 1.6) states "The first step is to identify the objective of the plan or project to help frame the consideration of alternatives. Alternative solutions are limited to those which would deliver the overall objective as the original proposal".
- 2.2.5 **Section 3** of this report sets out SZC Co.'s core objectives (which were subject to consultation as part of the formal pre-application consultation process) and presents how they reflect and are supported by relevant national and local policies.
- 2.2.6 Defining the Sizewell C Project need and objectives enables a short list of relevant potential alternative solutions to be identified at Step 3.
- 2.3 **Step 2 – Identify the potential harm the Sizewell C Project is predicted to cause to the integrity of the SPA and Ramsar site**
- 2.3.1 The outcome of SZC Co.'s Stage 2 **Shadow HRA Report** (Doc Ref. 5.10) is that an adverse effect on the breeding marsh harrier population of the Minsmere-Walberswick SPA and Ramsar site cannot be ruled out due to noise and visual stimuli produced during the construction phase of the main development site. **Section 4** of this report provides further details of the works which could cause an adverse effect on the integrity of the SPA and Ramsar site.

2.4 Step 3 – Produce a long list of potential alternative solutions to address the potential harm and screen these to produce a short list

2.4.1 The first part of this step – covered in **section 5** of this report – concerns identifying a list of potential alternative solutions in accordance with EC Guidance paragraph 1.3.1⁴ (Ref. 1.4), Defra Guidance paragraph 16⁵ (Ref 2.5), PINS Advice Note 10 paragraph 4.28⁶ (Ref. 1.7) and Provisions of Article 6 section 3.7.4 (Ref. 1.11).

2.4.2 The Defra Guidance gives examples of how the competent authority should use its judgement to identify relevant alternatives as in paragraph 13 (Ref. 1.6). In light of an example included in this Defra Guidance for an offshore wind renewable energy development⁷, which concluded that its consideration of alternative solutions should be limited to offshore wind developments, alternative forms of energy generation have not been included in the long list of alternatives considered in this report.

2.4.3 In accordance with the guidance above, the formulation of the long list of potential alternative solutions has not been constrained by economic considerations.

2.4.4 The second part of this step screens the long list of potential alternative solutions against the Sizewell C Project's need and the objectives (as defined in **section 3** of this report); only alternatives that meet or deliver the need and its objectives are considered in Step 4.

2.4.5 Where alternative solutions would clearly generate greater noise levels than the proposed approach assessed within the DCO application, these solutions have not been considered further following identification of the option on the long list. This applies to the following construction phase activities, as defined within the construction phase noise assessment provided in **Appendix 11B** of **Volume 2** of the **ES** (Doc Ref. 6.3):

- Construction of the piling platform and the piling activities – alternative forms of piling to that proposed within the DCO application would

⁴"They could involve alternative locations or routes, different scales or designs of development, or alternative processes."

⁵"Alternatives must be considered objectively and broadly. This could include options that would be delivered by someone other than the applicant, or at a different location, using different route, scale, size, methods, means or timing. Alternatives can also involve different ways of operating a development or facility."

⁶"Alternative solutions could include a project of a different scale, a different location, and an option of not having the scheme at all – the 'do nothing' approach."

⁷"In considering alternative solutions to an offshore wind renewable energy development the competent authority would normally only need consider alternative offshore wind renewable energy developments. Alternative forms of energy generation (e.g. building a nuclear power station instead) are not alternative solutions to this project as they are beyond the scope of its objective."

result in greater levels of construction noise and therefore such alternatives have not been considered further.

- Sea defences (remove existing, preparatory works and construction) – an alternative form of construction to that proposed within the DCO application is construction of a piled seawall. This alternative would result in greater noise disturbance and has not been considered further.

2.5 Step 4 – Consider whether any short listed potential alternative solutions are ‘feasible’ alternative solutions

2.5.1 The Defra Guidance paragraph 18 (Ref. 2.5) states that (emphasis added):

“The consideration of alternatives should be limited to options which are financially, legally and technically feasible. An alternative should not be ruled out simply because it would cause greater inconvenience or cost to the applicant. However, there would come a point where an alternative is so very expensive or technically or legally difficult that it would be unreasonable to consider it a feasible alternative ... If the authority considers an option is not feasible, it would not be necessary to continue to assess its environmental impacts.”

2.5.2 As such, the components of feasibility are:

- Legal feasibility

2.5.3 An alternative solution is considered to be not legally feasible where there is a legal impediment or where, from a legal or consenting perspective, it would be unreasonably difficult to deliver an alternative because it would have ‘unacceptable’ impacts.

- Technical feasibility

2.5.4 A potential alternative would not be technically feasible where it is impractical, incapable of being implemented, technically unsound and/or would not meet nuclear safety and regulatory requirements (including health and safety).

- Financial feasibility

2.5.5 A potential alternative would not be financially feasible where its cost is disproportionately high in the context of the scale of the reduction in the environmental effect that the alternative would achieve.

2.5.6 There are direct and indirect costs associated with potential alternative solutions.

- 2.5.7 Direct costs include the cost of using more expensive equipment or the additional costs of construction the alternative solution.
- 2.5.8 Indirect costs would arise from the consequences of (for example) extending the Sizewell C Project construction schedule due to the adoption of an alternative methodology. In this assessment, indirect costs have been derived based on an estimate of additional monthly Sizewell C Project running costs for different phases of the supply chain (contractors and consultants) and SZC Co. overhead costs. Standby costs have also been included for retaining people and plant where it is not practicable to redeploy them elsewhere and/or so they are not deployed elsewhere. The estimate does not allow for construction risks, the cost of delayed revenue or additional financing costs and, therefore, the estimated indirect costs represent a low precautionary estimate against the likely true costs.
- 2.5.9 Step 4 is presented in **section 6** of this report.
- 2.6 **Step 5 – Consider whether any feasible alternative solutions would have a lesser effect on the integrity of the SPA and Ramsar site**
- 2.6.1 To inform the competent authority's assessment (as per Defra Guidance (Ref. 1.6)), this step – presented in **section 7** of this report – looks at any alternative solutions identified in Step 4 and indicates whether they would have a lesser impact on the SPA and Ramsar site.

3 Step 1 – Sizewell C Project Need and Objectives

3.1 Introduction

- 3.1.1 This chapter sets out the need for the Sizewell C Project and SZC Co.'s core objectives. It also presents how the Sizewell C Project objectives reflect and are supported by relevant national and local policies.

3.2 The need for the Sizewell C Project

- 3.2.1 The need for the Sizewell C Project is detailed within the **Shadow HRA Report, Volume 3: Stage 4 IROPI** (Doc Ref. 5.10). Relevant text from this document is presented below.
- 3.2.2 The demand for electricity in the UK continues to grow (with a 20% increase in demand forecast by 2035 (Ref. 1.13)), despite energy conservation and efficiency. Significant electricity capacity is set to be retired by 2035.
- 3.2.3 Consequently, there will be a generation shortfall which will amount to 95GW by 2035 (Ref. 1.14) and NPS EN-1 (Ref. 1.11) identifies the urgent need for new (low carbon) electricity in the UK within the next 10-15 years.
- 3.2.4 The required scale of nuclear new build has been confirmed by the Energy Research Partnership, which has shown that 20GW–25GW is required, even if the National Renewable Energy Action Plan target for wind is met (Ref. 1.15).
- 3.2.5 Under the Climate Change Act 2008, the UK is committed to reducing its greenhouse gas emissions by at least 80% by 2050 relative to 1990 levels (Ref. 1.16). The Government's projections (Ref. 1.17) are that, without new nuclear power plants, the UK is expected to miss this 2050 emissions targets by up to 24%. Furthermore, the UK Government has since committed to a more stringent target of reducing emissions by at least 100% of 1990 levels (net zero) by 2050.
- 3.2.6 Continuity and reliability of supply – which nuclear energy delivers – are important considerations for energy security, which requires a diverse energy mix.
- 3.2.7 The urgent need for new nuclear power stations in this mix is firmly established in NPS EN-1 (Ref. 1.11) and EN-6 (Ref. 1.12). The Government's continued commitment to nuclear energy is confirmed in the Clean Growth Strategy (October 2017) (Ref. 1.18) and the Government's response to the consultation on the siting criteria and process for a new NPS for nuclear power beyond 2025 (Ref. 1.19).

- 3.2.8 New nuclear power stations need to be developed much earlier than the end of 2025 and critically by 2035 (Ref. 1.20).
- 3.2.9 The Government proposes to carry forward the sites listed in NPS EN-6 (Ref. 1.12) (that are not yet developed, including Sizewell C) into the new NPS (Ref. 1.19); the Sizewell C Project is the next new nuclear project in the pipeline.
- 3.2.10 There is an urgent need for new nuclear power in the UK, including at Sizewell.
- 3.3 **The Sizewell C Project objectives**
- 3.3.1 The objectives for the Sizewell C Project are set out in Chapter 12 (specifically Table 12.1) of the Stage 2 Consultation Document (Ref. 1.21). The objectives have, therefore, been subject to consultation during the formal pre-application consultation phase.
- 3.3.2 The Sizewell C Project objectives are presented in **Table 3.1**, alongside detail on how each of the objectives reflect – and are supported by – national and local planning policies. Information on how each of the objectives are supported by national and local planning policies has been sourced from the **Planning Statement** (Doc Ref. 8.4) and the Stage 2 Consultation Document (Ref. 1.21).
- 3.4 **Use of Sizewell C Project need and objectives in this assessment**
- 3.4.1 As described in **section 2** of this report, the need for the Sizewell C Project and its objectives have been used to screen the long list of potential alternative solutions identified in Step 3 of the assessment in order to derive a short list; see **section 5** of this report.
- 3.4.2 Only alternatives that meet or deliver the Sizewell C Project need and objectives are considered in Step 4, which determines whether any short-listed potential alternative solutions are ‘feasible’ alternative solutions. That is, would the alternative deliver against the urgent need for new nuclear power to support the UK in meeting its requirement for 95 gigawatts of new build electricity capacity by 2035, and would it meet the Sizewell C Project objectives defined in **Table 3.1**?
- 3.4.3 In the context of delivering the urgent need for new nuclear power (i.e. the Sizewell C Project need), where a potential alternative solution would extend the construction schedule by more than 12 months, it is considered that the need would not be met. This is because:

- NPS EN-1 (Ref. 1.11) explicitly identifies the ‘urgent’ need for new (low carbon) electricity nationally significant infrastructure projects (NSIPs) in the UK.
- Extensions to the construction programme further delay the date by which SZC Co. can deliver the urgent need for new low carbon electricity, contrary to national policy.
- Short non-continuous delays to the construction process (e.g. not working during the most sensitive periods for marsh harrier foraging) are inefficient and have potential to result in cumulative schedule delays that the Sizewell C Project may not be able to tolerate. The result would be compounded delays / stand-down periods, resulting in impacts on productivity and a major extension to the construction programme. This would result in receptors being exposed to construction related disturbance for much longer periods of time.

3.4.4 As such, alternative options which would create a 12 month or more extension to the construction schedule, such as stand-down periods during the marsh harrier breeding season, or do not meet the Sizewell C Project objectives, have not progressed to Step 4.

Table 3.1: Overview of Sizewell C Project objectives

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
1	Biodiversity and geological conservation.	To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.	<p>NPS EN-1 (Ref. 1.11) states that the applicant should clearly set out any effects on internationally, nationally and locally designated sites of ecological and geological conservation importance. Development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought.</p> <p>The effects of the construction of a new nuclear power station on the groundwater regime and its effects on terrestrial/coastal habitats should be assessed, as required by NPS EN-6 (Ref. 1.12).</p> <p>NPS EN-1 (Ref. 1.11) states, in relation to biodiversity and geological conservation, that:</p>
2		To avoid adverse impacts on valuable ecological networks and ecosystem functionality.	<p><i>“As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought”.</i></p> <p>NPS EN-1 (Ref. 1.11) requires the decision maker to attach appropriate weight to designated sites, protected species, habitats and to biodiversity within the wider environment.</p>
3		To maximise opportunities for restoration, enhancement and connection of natural habitats.	
4	Climate change adaptation.	To adapt to a changing climate, including maintaining an agreed standard of	<p>NPS-EN1 (Ref. 1.11) states that <i>“applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure.”</i></p> <p>NPS EN-1 (Ref. 1.11) and NPS EN-6 (Ref. 1.11) require assessment of the effect on coastal change, defined by NPS EN-1 (Ref.</p>

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
		flood defence and coastal protection for the site.	1.11) as “physical change to the shoreline, i.e. erosion, coastal landslip, permanent inundation and coastal accretion”.
5	Climate change mitigation.	To minimise greenhouse gas emissions.	NPS EN-1 (Ref. 1.11) states that the decision-maker should: “generally give air quality considerations substantial weight where a project would lead to a deterioration in air quality in an area, or leads to a new area where air quality breaches any national air quality limits. However, air quality considerations will also be important where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits.”
6	Coastal processes.	To secure a balance between the longer-term impacts of the coastal environment on the site and the impacts of the site on the environment.	NPS EN-1 (Ref. 1.11) and NPS EN-6 (Ref. 1.12) require assessment of the effect on coastal change, defined by NPS EN-1 (Ref. 1.11) as “physical change to the shoreline, i.e. erosion, coastal landslip, permanent inundation and coastal accretion”. Applicants are required to “undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures”. Section 3.8 of NPS EN-6 (Ref. 1.12) states: “The Nuclear Appraisal of Sustainability Report (AoS) identified that the construction of new coastal and fluvial defences and possible marine landing jetties/docks necessary to support the nuclear power station could affect coastal processes, hydrodynamics and sediment transport processes at coastal and estuarine sites. These impacts could lead to coastal erosion or accretion. There could also be changes to offshore features such as submerged banks and ridges and marine ecology.”
7		To minimise impacts on coastal processes beyond the bounds of the shores fronting the site, through appropriate engineering design and coastal management.	

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
8	Communities	To minimise impacts on tourism.	<p>The Stage 2 Pre-Application Consultation Document (Ref. 1.21) outlines SZC Co.'s vision for the Sizewell C Project. This states:</p> <p><i>"In recognition of the environmental sensitivity of the location, EDF Energy (SZC Co.) will ensure that the power station is designed and delivered in such a way as to limit any adverse effects on the environment and on local communities as far as is reasonably practical. Any significant adverse effects of the construction, operation or decommissioning of the power station shall be mitigated where practical and appropriate in a way which is environmentally responsible and sensitive both to the needs of the community and to the strategies of the relevant authority."</i></p>
9		To minimise impacts on property and land values, and limit potential for planning blight.	
10		To minimise disruption of basic services and community infrastructure, including emergency services.	<p>NPS EN-6 (Ref. 1.12) requires applicants to <i>"demonstrate that the proposed development would not have an unacceptable adverse impact on significant infrastructure."</i> "Significant infrastructure" is stated to include:</p> <ul style="list-style-type: none"> • motorways, major highways (for example A roads); • strategic rail network; • gas transmission network; • electricity transmission network; • airports; • ports; and • groundwater source protection zones and drinking water protected areas.
11		To encourage the development of sustainable communities.	<p>This objective was included within the list of objectives used during the Nuclear AoS process (Ref. 1.22). SZC Co. has adopted this as one of the Sizewell C Project objectives.</p>
12	Cultural heritage and landscape.	To minimise impacts on internationally and nationally important features	<p>NPS EN-1 (Ref. 1.11) acknowledges that <i>"the construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment."</i></p> <p>NPS EN-1 (Ref. 1.11) states that:</p>

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
13		of the historic environment.	<p><i>“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.”</i></p> <p>NPS EN-1 (Ref. 1.11) acknowledges that:</p> <p><i>“Virtually all energy NSIPs will have effects on the landscape. 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></p> <p>NPS EN-1 (Ref. 1.11) also recognises the importance of nationally designated landscapes, such as National Parks, the Broads and areas of outstanding natural beauty (AONBs), noting that they benefit from the <i>“highest status of protection”</i>.</p> <p>NPS EN-1 (Ref. 1.11) includes a series of policy tests that can be used in coming to a view as to whether harm to an AONB can be considered acceptable in planning terms:</p> <p><i>“National Parks, the Broads and AONBs have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty... The conservation of the natural beauty of the landscape and countryside should be given substantial weight by the IPC in deciding on applications for development consent in these areas.”</i></p> <p>NPS EN-6 (Ref. 1.12) provides specific guidance in relation to the landscape and visual impacts associated with nuclear power generating stations.</p> <p><i>“The Nuclear AoS identified that the potentially suitable sites share the following landscape issues: the sites are generally in less populated areas that may have value for visual amenity and as landscape resources; they are coastal/estuarine sites; and the scale of the facilities means that the scope for visual mitigation is quite limited. In addition, because of the timescales involved, there is some uncertainty over future land uses once sites are decommissioned.”</i></p>
		To minimise impacts on the setting and quality of built heritage, archaeology and historic landscapes.	
14		To minimise impacts on nationally important landscapes.	
15		To minimise impacts on landscape character, quality and tranquillity, diversity and distinctiveness.	

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
			<p><i>There is the potential for long-term effects on visual amenity, especially at Sellafield because of the proximity to the Lake District National Park, and at Sizewell, given the Suffolk Coast and Heaths Area of Outstanding Natural Beauty.</i></p> <p>It is important to recognise that the Government included Sizewell as a potentially suitable site in NPS EN-6 (Ref. 1.12), fully aware of the fact that the Sizewell C Project would have impacts on the AONB.</p>
16	Employment, skills and inward investment.	To nurture and develop skills.	<p>Socio-economic matters are identified as a generic impact in NPS EN-1 (Ref. 2.10) and as a nuclear impact in NPS EN-6 (Ref. 1.11). NPS EN-1 (Ref. 1.11) provides a (non-exhaustive) list of relevant socio-economic impacts, which includes:</p> <ul style="list-style-type: none"> the creation of jobs and training opportunities; provision of additional local services and infrastructure improvements; effects on tourism; the effect of an influx of workers on local population dynamics, including infrastructure requirements and social cohesion; and cumulative effects, should more than one NSIP be sought in the same area at the same time. <p>NPS EN-6 (Ref. 1.12) requires assessment of all of the above matters as well as “<i>potential pressures on local and regional resources, demographic change and economic benefits</i>”.</p> <p>The Stage 2 Pre-Application Consultation (Ref. 1.21) document defines the Sizewell C Project vision as: <i>“EDF Energy (SZC Co.) intends to deliver a nuclear power station at Sizewell C that will make a major contribution to the nation’s low-carbon energy needs. The development, operation and ultimate decommissioning of the power station will be undertaken in a manner consistent with the highest standards of safety, reliability and sustainability.</i></p> <p><i>EDF Energy (SZC Co.) will strive to ensure that the inherent benefits of its own investment in Sizewell C are captured in a way which makes the most of its practical contributions to the local and regional economy.”</i></p>
17		To create employment opportunities.	
18		To encourage inward investment.	
19	Equality and	To encourage	This objective was included within the list of sustainability appraisal objectives applied to the Suffolk Coastal District Local Plan

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
	engagement.	equality through community participation.	(Ref. 1.23). SZC Co. has adopted this as one of the Sizewell C Project objectives.
20	Flood risk.	To avoid increased flood risk (including coastal flood risk).	<p>NPS EN-1 (Ref. 1.11) requires applicants to submit a flood risk assessment (FRA) if their proposal lies within Flood Zones 2 or 3 or is more than one hectare in size and located in Flood Zone 1. The aim of planning policy with regard to flood risk is stated to be:</p> <p><i>"...to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk."</i></p> <p>NPS EN-6 (Ref. 1.12) acknowledges that nuclear power stations need access to cooling water and so need to be located in coastal or estuarine areas. This makes them more likely to be at risk of flooding without appropriate mitigation measures. The Government has decided to identify the sites listed in section 4.1 of NPS EN-6 (Ref. 1.12) as potentially suitable for new nuclear power stations:</p> <p><i>"...in spite of some being located in higher flood risk zones, noting that the independent Nuclear Regulators have advised that they have the potential to be protected from flood risk throughout their lifetime, and because of the lack of alternative sites and the need for new nuclear development. As a result, the second limb of the Exception Test does not apply to new nuclear development."</i></p> <p>NPS EN-6 (Ref. 1.12) confirms that the sequential test has been applied by the Government as part of the Strategic Siting Assessment process. Nuclear power stations promoted on any of the listed sites are therefore excluded from the need to apply the test (and the second limb of the exception test). The sequential approach still applies at site level and so an FRA is still required.</p>
21	Human health and well-being.	To minimise impacts on physical and mental health.	<p>NPS EN-1 (Ref. 1.11) states that <i>"energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health."</i></p> <p>NPS EN-6 (Ref. 1.12) states that <i>"radiation from nuclear power stations requires careful management during and beyond the operational life of the power station."</i> Section 3.12 goes on to state that <i>"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</i></p>

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
			<p>services”.</p> <p>The AoS of the revised draft Nuclear NPS (Ref. 1.24) identified the potential for positive effects for health and well-being resulting from the positive socio-economic benefits of new nuclear power stations.</p>
22		To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.	<p>NPS EN-1 (Ref. 1.11) requires assessment of noise and vibration as generic impacts of new energy infrastructure. NPS EN-1 (Ref. 1.11) states:</p> <p><i>"The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission."</i></p> <p>NPS EN-1 (Ref. 1.11) states that consent should not be granted unless the following aims are met:</p> <ul style="list-style-type: none"> • 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. <p>NPS EN-1 (Ref. 1.11) therefore looks for noise effects which would have significant effects on health and the quality of life to be avoided if possible and for other effects to be mitigated and minimised if not. It also looks for improvements to the noise environment if possible.</p> <p>NPS EN-1 (Ref. 1.11) requires applicants to undertake an air quality assessment as part of the Environmental Statement (ES).</p>
23		To minimise loss of access to recreational opportunities, their	<p>NPS EN-1 (Ref. 1.11) makes specific reference to the need for applicants to consider coastal recreation:</p> <p><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</i></p>

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
		quality and user convenience, and to enhance these where possible.	<i>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> NPS EN-6 (Ref. 1.12) states that “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.”
24	Nuclear safety.	To deliver the highest standards of nuclear safety.	The Stage 2 Pre-Application Consultation document (Ref. 1.21) defines the Sizewell C Project vision as: “EDF Energy (SZC Co.) intends to deliver a nuclear power station at Sizewell C that will make a major contribution to the nation’s low-carbon energy needs. The development, operation and ultimate decommissioning of the power station will be undertaken in a manner consistent with the highest standards of safety, reliability and sustainability.”
25	Radioactive waste.	To help shape the long-term solution to radioactive waste.	The AoS: Site Report for Sizewell (Ref. 1.22) states that “generating electricity by nuclear power creates radioactive waste, some of which remains potentially hazardous for thousands of years. The storage and disposal of this waste is an important part of the nuclear fuel cycle and needs careful long-term management.”
26	Resources.	To promote the sustainable use of materials.	This objective was included within the list of Sustainability Appraisal objectives applied to the Suffolk Coastal District Local Plan (Ref. 1.23). SZC Co. has adopted this as one of the Sizewell C Project objectives.
27		To minimise impacts on potable water supply.	NPS EN-1 (Ref. 1.11) acknowledges that infrastructure development can have adverse effects on the water environment. This could be due to increased demand for water, discharges to water and ecological effects resulting from physical modifications to the water environment. Applicants are required in their ES to assess the impact of their proposal on water quality, water resources and the physical characteristics of the water environment.
28	Soils, geology and land use.	To make most efficient use of land and minimise impacts on geological and soil resources.	NPS EN-1 (Ref. 1.11) requires the assessment of direct effects on the use, or planned use, of land for other types of development. This includes open space and green infrastructure. NPS EN-1 (Ref. 1.11) reiterates the point made with regard to landscape and visual impacts that it may not be possible to fully avoid or mitigate effects upon land use:

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
29		To avoid the use of greenfield land and to encourage the reuse of brownfield sites.	<p><i>“Although in the case of much energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site...applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles including the layout of the project.”</i></p>
30		To avoid the contamination of soils and any adverse impacts on soil functions.	
31	Transport infrastructure.	To minimise adverse impacts on the function and efficiency of strategic transport infrastructure and to enhance this infrastructure where feasible.	<p>NPS EN-1 (Ref. 1.11) recognises that a new energy NSIP may give rise to substantial impacts on the surrounding transport infrastructure and the decision maker should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development. Detrimental impacts on the surrounding transport infrastructure should be managed and mitigated during all stages of the development. Demand management measures must be considered, including other modes of transport such as water-borne or rail transport. Controls must be put in place for heavy goods vehicle (HGV) movements, ensuring arrangements are in place for any abnormal disruption. The applicant is required to provide a Transport Assessment and Travel Plan that includes measures to manage demand, in the interests of mitigating transport impacts. Measures to improve access by public transport, walking and cycling are an essential component of Travel Plans.</p>
32	Water environment.	To minimise impacts on coastal and marine water quality.	<p>NPS EN-1 (Ref. 1.11) acknowledges that infrastructure development can have adverse effects on the water environment. This could be due to increased demand for water, discharges to water and ecological effects resulting from physical modifications to the water environment.</p> <p>NPS EN-6 (Ref. 1.12) confirms that the Nuclear AoS <i>“identified potential adverse effects on water resources including effects on coastal processes, hydrodynamics and sediment transport.”</i> It goes on to confirm that, in addition to the matters required to be considered by the applicant in NPS EN-1 (Ref. 1.11) the applicant <i>“should also set out the characteristics of cooling water for new nuclear power stations and the specific implications of the proposal on marine and estuarine environments.”</i></p>
33		To minimise impacts on surface water quality, hydrology and channel geomorphology.	

ID	Theme / topic	Objective	Basis of the Objective(s) (Emphasis Added)
34	Waste.	To minimise waste and apply the principles of waste hierarchy.	<p>A number of priorities for sustainable waste management are set out at section 5.14 of NPS EN-1 (Ref. 1.11), specifically:</p> <ul style="list-style-type: none"> • prevention; • preparing for reuse; • recycling; • other recovery, including energy recovery; and • disposal.
35	Construction.	To promote the use of sustainable methods of construction, including materials, energy efficiency, water recycling, aspect etc.	<p>This objective was included within the list of Sustainability Appraisal objectives applied to the Suffolk Coastal District Local Plan (Ref. 1.23). SZC Co. has adopted this as one of the Sizewell C Project objectives.</p>

4 Step 2 – Assessed Potential for Harm

4.1 Introduction

4.1.1 This section implements Step 2 of the methodology by:

- Describing the envisaged potential for harm. That is, those activities where the Stage 2 assessment has concluded an adverse effect on integrity cannot be ruled out, beyond reasonable scientific doubt.
- Summarising particular aspects of the Sizewell C Project works that relate to the potential for harm.
- Presenting the proposed mitigation for the potential harm, as described in **Chapter 8** of the **Shadow HRA Report** (Doc Ref. 5.10).
- Identifying any residual potential for harm which requires assessment to determine if there are alternative solutions available.

4.2 What is the assessed potential for harm?

4.2.1 The conclusion of the **Shadow HRA Report** (Doc Ref. 5.10) with respect to the effect of visual disturbance on the marsh harrier population is based on the assumption that foraging marsh harrier outside a potential visual impact zone which extends 150 metres (m) around the main development site boundary would not be disturbed by the presence of human movement or infrastructure within the main development site. For noise disturbance, a likely noise level threshold at which a potentially adverse behavioural response could be initiated by foraging marsh harrier is taken as 70 decibel (dB) LA_{max}⁸.

4.2.2 The **Shadow HRA Report** (Doc Ref. 5.10) makes an estimate of the loss of foraging habitat from noise and visual disturbance predicted to occur during construction of the main development site – refer to **section 1.2** of this report for details of the proposed activities. Coastal grazing marsh, reedbed and agricultural land are likely to provide the three main foraging habitats for marsh harrier nesting at Minsmere. The extent of the assumed habitat loss to foraging marsh harrier as a result of noise and visual disturbance during the construction phase has been calculated as follows:

- The distribution and extent of the broad habitat-types surrounding the Minsmere marsh harrier nesting area were mapped, using available land classification information from existing mapped and aerial data.

⁸ LA_{max} – a measure of the maximum sound pressure level (A-weighted) in a given measurement interval, usually measured with fast time weighting.

- The total areas of coastal grazing marsh, reedbed and agricultural land were extracted from the mapped data for a series of 1km concentric radii centred on the Minsmere marsh harrier nesting area, out to a distance of 4km.
- The areas of coastal grazing marsh, reedbed and agricultural land assumed to be 'lost' to foraging marsh harrier (i.e. due to being within either the 70dB LAmax footprint, Sizewell Marshes or else the 150m potential visual impact zone) were calculated for each of the 1km concentric radii and expressed as a percentage of the total habitat area.

4.2.3 On this basis, the percentage of each foraging habitat-type potentially 'lost' to marsh harriers at different distances out from the nesting area as a result of construction-related disturbance (from both visual and noise stimuli) was estimated.

4.2.4 Determining the consequences of the potential loss of this area of foraging habitat on the marsh harrier population at Minsmere requires consideration of the potential foraging value of the habitat, the likely behavioural response of harriers to the loss of the habitat and the likely resulting effect on the population (productivity and mortality).

4.2.5 Increased noise and visual disturbance associated with construction activities at the main development site may cause marsh harriers from the Minsmere nesting area to be displaced (as a result of an assumed barrier effect) from parts of their existing foraging ranges (including the Sizewell Marshes and Minsmere south levels).

4.2.6 Given that there is likely to be significant overlap in the foraging ranges of birds breeding at Minsmere, this effective loss of habitat through displacement could affect all of the breeding population at Minsmere (i.e. approximately 50% of the SPA population). The aggregated figure for wetlands plus arable loss equates to approximately 20% of the foraging resource available to marsh harriers within 4km of the Minsmere nesting area.

4.2.7 The Shadow HRA reports that marsh harriers show significant plasticity in foraging behaviour and can adapt to both changes in prey availability and habitat quality without showing marked reductions in breeding productivity. However, given the long-term duration (approximately 10 years) of the construction period, it is acknowledged that over this time period the potential loss of approximately 20% of foraging resource within 4km of Minsmere could conceivably affect the overall breeding productivity.

- 4.2.8 A reduction in productivity does not necessarily translate into a reduction in population size, particularly for relatively long-lived species such as marsh harriers (which may have an average lifespan of six to seven years). However, given the duration of the construction period and the fact that young birds may otherwise recruit into the population, then the potential exists for a reduction in the SPA population size to result from any reduction in breeding productivity.
- 4.2.9 In light of the above analysis, it is not possible to discount the possibility of an adverse effect on the marsh harrier population as a consequence of noise and visual disturbance from construction activities within the main development site and, therefore, an adverse effect on the integrity of the Minsmere-Walberswick SPA and Ramsar site cannot be excluded.
- 4.2.10 It should be noted that the above conclusion is drawn on a highly precautionary basis with regard to the following:
- the noise threshold at which marsh harrier may exhibit a disturbance response which could have an impact at a population level;
 - the predicted peak noise generation during the construction phase;
 - the duration over which peak noise emissions would occur; and
 - the zone of sensitivity to visual disturbance.
- 4.2.11 Collectively, these various elements of precaution lead to a highly precautionary prediction of the effect of the extent of potential foraging resource that could be 'lost' to marsh harriers. Furthermore, it should be noted that there is a lack of direct effect on the SPA and Ramsar site itself.
- 4.2.12 No adverse effects are predicted in association with the operation of the power station, or at any of the associated development sites during their construction, operation and decommissioning phases.
- 4.3 **Sizewell C Project works associated with noise and visual disturbance**
- 4.3.1 The Sizewell C Project is a complex project and it is evident from the Description of Development – Construction provided in **Chapter 3, Volume 2** of the **ES** (Doc Ref. 6.3) that the inherent complexity of the construction project, programme and phasing makes accurate and representative noise prediction a challenge.
- 4.3.2 The main development site construction phase noise modelling exercise has assumed that each activity required for each phase would occur for the duration of the phase, and all sub-phases would occur simultaneously.

This approach is highly precautionary, but has been adopted largely because there is insufficient construction design detail available at this stage to fully account for phase overlaps and sub-phase duration. The approach taken to the modelling, the outputs of which have informed the **Shadow HRA Report** (Doc Ref. 5.10), was therefore highly conservative.

4.3.3 As detailed within the construction phase noise assessment, provided in **Appendix 11B** of **Volume 2** of the **ES** (Doc Ref. 6.3), and the figures included in **Appendix A** of this assessment, the highest noise levels are likely to occur during site stripping / levelling and any concurrent works (relatively early in the Sizewell C Project during Phase 1 and Phase 2).

4.3.4 As detailed in the **Shadow HRA Report** (Doc Ref. 5.10), it is possible (albeit unlikely) that noise levels of greater than 80dB L_{Amax} across the main development site could act as a barrier to the movement of foraging marsh harriers from the Minsmere reedbeds to Sizewell Marshes. Such noise levels are predicted to be generated within the temporary construction area -between Minsmere Reedbeds and Sizewell Marshes during all five phases of development and, therefore, the barrier effect for foraging marsh harriers has been assumed to apply during all five construction phases, as illustrated in **Appendix A** of this assessment.

4.4 What are the proposed mitigation measures?

4.4.1 The site layout would incorporate noise barriers in the form of landscape bunds and/or acoustic screens in order to reduce, as far as practicable, the spread of construction noise from the main development site as provided in the construction phase noise assessment at **Appendix 11B** of **Volume 2** of the **ES**. These noise barriers form part of the Sizewell C Project design, and can be seen on the indicative boundary treatments cross-section drawing in **Appendix 2/11B/C1** construction phase noise assessment at **Appendix 11B** of **Volume 2** of the **ES**.

4.4.2 The noise barriers embedded into the design are as follows:

- Barrier 4 (B4) – 5m ‘acoustic fence’.
- Barrier 6 (B6) – 3m earth bund.
- Barrier 7 (B7) – 3m earth bund with a 2m ‘acoustic fence’ on top of the ridge (5m total height).

4.4.3 In addition, the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11) requires that all construction contractors follow standard good construction practice as per BS 5228-1:2009 (Ref. 1.25) and BS 5228-2:2009 (Ref. 1.26). This includes measures which could not be assumed in the model as it is not possible to know where and how certain construction activities would be undertaken, including the positioning of noisy plant as far as practicable from receptors and, where possible the application of silencers, mufflers or enclosures to items of plant. For some receptors, such measures are likely to result in construction noise levels lower than those predicted, but the magnitude of this reduction cannot be predicted at this stage.

4.5 What is the residual potential for harm?

4.5.1 As set out above, the **Shadow HRA Report** (Doc Ref. 5.10) has concluded that an adverse effect on integrity cannot be ruled out in respect of the breeding marsh harrier population of the Minsmere-Walberswick SPA and Ramsar site irrespective of the mitigation measures proposed. Should the Examining Authority and/or Secretary of State for Business, Energy and Industrial Strategy reach the same conclusion, then the DCO can only be granted if the requirements of HRA Stages 3 and 4 can be demonstrated and the necessary compensation measures can be secured.

4.5.2 Considering the above, it is concluded that the residual potential for harm that needs to be examined in the Stage 3 HRA process is potential noise and visual disturbance to the breeding marsh harrier population and, specifically, their foraging activities.

4.5.3 **Sections 5 and 6** of this report, therefore, focus on the residual potential for harm to the breeding marsh harrier population due to noise and visual stimuli associated with the construction phase of the main development site.

5 Step 3 – Producing a Long List of Potential Alternative Solutions

5.1 Introduction

5.1.1 This chapter implements Step 3 of the methodology by:

- Identifying a long list of potential alternative solutions for the potential harm.
- Screening the long list of potential alternative solutions against the Sizewell C Project need and objectives to produce a short list.

5.2 Long list of potential alternative solutions

5.2.1 **Section 1.2** of this report details the Sizewell C Project activities which are predicted to cause the noise and visual disturbance effect on the foraging marsh harrier population. As detailed above, the disturbance effect to marsh harrier is predicted to arise due to the combination of multiple construction phase activities occurring at the same time within the main development site (i.e. there is not one particular construction phase activity which is solely the cause of the disturbance effect). **Table 5.1** presents a long list of potential alternative solutions to these Sizewell C Project works according to the methodology described in **section 2.2** of this report.

5.2.2 **Table 5.1** starts by defining high level alternatives to the Sizewell C Project (Options 1 to 5). Given the nature of the predicted effect to marsh harriers (i.e. noise and visual disturbance during construction), Option 6 considers more detailed alternatives to each construction phase activity incorporated into the construction phase noise modelling, which are defined within the construction phase noise assessment as provided in **Appendix 11B** of **Volume 2** of the **ES**.

Table 5.1: Long list of potential alternative solutions

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
1. Do nothing.	Construct a power station at Sizewell.	Not progressing the Sizewell C Project.	Do not construct a power station at Sizewell or progress the associated development.	Removes the source of noise and visual disturbance.
2. Alternative locations.	Construct a power station at Sizewell.	Constructing the power station at a different site.	Locate the power station elsewhere in the UK.	Removes the source of noise and visual disturbance at Sizewell.
3. Alternative scales.	Construct a power station with two EPR™ units.	Construct a power station with fewer EPR™ units.	Construct one EPR™ unit.	The same level of noise and visual disturbance would occur, however, it would occur over a shorter period.
4. Seasonal restrictions.	Construct with no seasonal restrictions.	Temporarily cease works on a seasonal basis.	Undertake works outside of the most sensitive period for marsh harrier foraging during each year of construction.	Removes the source of noise and visual disturbance during the most sensitive period (but would cause the construction programme to be greatly extended).
5. Phasing the construction works differently.	Undertaking the works in five main phases.	Undertaking each construction phase in series.	As detailed in section 1.2 of this report, multiple construction phase activities are to be undertaken in parallel (i.e. there is overlap between many of the construction phases). The alternative to this would be to undertake each construction phase in series.	This option is likely to reduce the peak noise levels predicted to occur during construction (however the disturbance effect would occur over a longer period). The visual disturbance effect would remain, and would last for a longer period of time as the programme would be extended.
6. Alternative construction methods / locations for construction	--	The Order Limits are constrained by the space available to construct the power station. The area of land available to work within limits the range of alternative solutions that could be implemented. SZC Co. has chosen to site the temporary construction area in close proximity to the main construction area to maximise efficiency and safety during construction. Siting the temporary construction area in a location remote from the main construction area would not be feasible given the large quantities of construction material required and the size of the components involved. However, for completeness and		

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
activities.		to illustrate a robust consideration of alternatives, the alternative solutions to each of the construction phase activities required for the main development site are detailed below. There are further detailed in Appendix 11B of Volume 2 of the ES .		
Phase 1 activities: site establishment and preparation for earthworks (Years 1-2) – refer to Figure 3.4 of Volume 2, Chapter 3 of the ES .				
Felling	Undertake felling and site stripping / levelling where needed across the site.	Felling activities would be undertaken across the site as required. The extent of felling required would be linked to the location of existing vegetation and the construction footprint. A re-arrangement of the construction site within the Order Limits could have a small influence the amount of felling required, but ultimately all land within the Order Limits is needed to allow construction of the power station. Consequently, it is concluded that there are no alternatives to this activity and felling is not considered further.		
Stripping / site levelling.		As above.		
Water management zones.	Use of water management zones as part of the site Outline Drainage Strategy (Volume 2 Appendix 2A of the ES) to adequately attenuate and, if required, treat surface water run-off prior to discharge to either watercourses or the ground.	Alternative locations for the water management zone.	Locate the water management zones elsewhere on-site.	See footnote. ⁹
Borrow pit	Excavation from borrow pits is required to source	Import all material onto site.	Remove the requirement for on-site borrow pits by importing all fill materials	Has potential to reduce the noise and visual disturbance by reducing the extent

⁹ Noise and visual disturbance associated with this alternative solution (i.e. relocating the activity elsewhere within the Order Limits) would still contribute to the overall levels of noise and visual disturbance from the site. However, the distribution of noise and visual disturbance across the construction site would be expected to change, according to the location of the elements of the construction works. It should be noted that relocating an activity elsewhere within the site boundary would become more challenging during the latter phases of construction works, as space within the site would be reduced as the various other activities are constructed.

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
excavation.	construction materials. It would also be necessary to import good quality engineering material by either rail or road to supplement that sourced from borrow pits.		and exporting materials off-site.	of on-site earthworks.
		Excavate borrow pits elsewhere on-site.	Locate the borrow pits elsewhere on-site.	See footnote ⁹ .
		Amend the proportion of material sourced from on-site and off-site sources.	Reduce the size of the on-site borrow pits and import more material from off-site sources.	Has potential to reduce the noise and visual disturbance by reducing the extent of on-site earthworks.
Borrow stockpiling. pit	Stockpiles are proposed to be used on-site to manage construction materials within the space that is available.	Alternative locations for the stockpiles.	Locate stockpiles elsewhere on-site.	See footnote ⁹ .
	Once the borrow pits have been excavated, they would be prepared for backfilling with material from elsewhere on-site. Once the borrow pit has been backfilled and after settlement, it has capacity to act as a stockpile.	Transport material to Wallasea Island rather than stockpiling on-site ¹⁰ .	Ship material to the Royal Society for the Protection of Birds (RSPB) Wallasea Island Wild Coast Project in Essex, where material would have been used to contribute to the ongoing habitat creation scheme.	Potential for reduction in the noise and visual disturbance associated with movement of soils around site. However, as detailed in the Stage 2 Consultation Document (Ref. 1.21), this option would require construction of a temporary jetty to support the transport of material to Wallasea Island which would have its own noise and visual disturbance impacts.
Contractor's compound.	Erection of a contractor's compound.	Alternative locations for the compound.	Locate compound elsewhere on-site.	See footnote ⁹ .
Piling platform and piling.	Use of reactive piling.	Alternative forms of piling.	As noted in section 2 of this report, alternative forms of piling to the reactive piling defined in the construction phase noise assessment, as in Appendix 11B of	

¹⁰ SZC Co. has explored the option of providing excavated material to the RSPB Wallasea Island Wild Coast Project. This option was included within the Stage 2 Consultation Document (Ref. 3.9).

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
			Volume 2 of the ES , would result in greater noise disturbance and therefore no alternatives have been considered further.	
Culvert and embankment construction.	The Sizewell Marshes SSSI crossing would comprise an embankment and culvert in the north eastern area of the main platform.	Construct a crossing over Sizewell Marshes via alternative means.	Single span bridge with vertical wing walls.	Significant changes to the noise and visual disturbance impacts are unlikely as construction works would still be required for all options.
			Three span bridge.	
			Causeway over the culvert with adjacent short-term bridge.	
		Do not construct a culvert or embankment.	Access the construction area from the south using the existing access roads at Sizewell A and B.	Has potential to reduce the noise and visual disturbance by removing the need to build the crossing.
		Alternative locations for the crossing.	Locate the crossing elsewhere on-site.	Significant changes to the noise and visual disturbance impacts are unlikely as construction works would still be required for this option.
Haul roads (construction of the haul roads).	A haul road would provide a dedicated route for heavy earthmoving plant from the main platform to the temporary construction area stockpiles. A segregated route would be provided for general site traffic.	Transport materials to site by alternative means other than rail and road.	Delivery of materials to and from site by sea.	Has potential to reduce the noise and visual disturbance by reducing the reliance on the haul roads and rail, however, this would require construction of a jetty which would have its own noise and visual disturbance impacts.
		Alternative locations for the haul roads.	Locate the haul roads elsewhere on-site.	See footnote ⁹ .
Main access road (construction of the road).	It is proposed that the main access to Sizewell C, serving both the	Use of existing access roads.	Use of the existing Sizewell Power station complex access road.	Has potential to reduce the noise and visual disturbance by avoiding the need to construct a new access road.

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
	construction and operational phases, would be provided by a new junction with the B1122 in the west of the main development site.	Alternative locations for the access road.	Locate the access road elsewhere on-site.	See footnote ⁹ .
Main site office – piled foundations.	Installation of piles to support the main site offices.	Alternative locations for the offices.	Locate the offices elsewhere on-site.	See footnote ⁹ .
		Alternative foundation design.	Do not use piles for the foundations.	Has potential to reduce the noise and visual disturbance.
Entrance plaza (construction of the entrance plaza).	The main development site would be arranged as a secure construction site with controls on the people and materials entering and leaving the site. The site entrance hub would be located east of the new roundabout off the B1122.	Alternative locations for the site entrance.	Locate the site entrance elsewhere on-site.	See footnote ⁹ .
Concrete batching plant ground preparation.	Use of on-site concrete batching plants.	Secure concrete by alternative means.	Import concrete from an off-site source.	Has potential to reduce the noise and visual stimuli by reducing the requirement to construct on-site batching plants.
		Alternative locations for the batching plant.	Locate the batching plant elsewhere on-site.	See footnote ⁹ .
Sea defences – remove existing, preparatory works and construction.	The proposed permanent sea defence would be in the form of a landscaped primary embankment built seaward of the outer	Alternative forms of construction for the sea defence.	Construction of a piled seawall.	As noted in section 2 of this report, this alternative would result in greater noise disturbance as has therefore not been considered further.

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
	security fence boundary. Coastal protection elements, in the form of rock armour, would also be embedded into the landscape of the sea defences to provide the required level of protection against extreme events.		Construction of groynes.	Has potential to reduce the noise and visual stimuli by reducing the earthworks requirement at the coastal margin (however construction activities would still be required to install the groynes).
			Construction of an offshore breakwater.	Has potential to reduce the noise and visual stimuli by reducing the earthworks requirement at the coastal margin (although earthworks would still be required within the coastal waters).
Cut off wall platform and construction.	Installation of piles to support soft strata during installation of the cut off wall. The cut off walls would be installed to depths of approximately 50m below ground level. Large reinforcement cages are to be used, with concrete provided by on-site concrete batching plant.	Alternative forms of construction.	Use of a concrete pumped ring main around the site (as opposed to concrete batching plant).	Has potential to reduce the noise disturbance. The visual disturbance would however remain.
			Use of prefabricated cages (manufactured off-site) to stabilise the trench for the cut off wall during excavation.	Has potential to reduce the noise and visual disturbance.
Phase 2 activities: main development site earthworks and completion of temporary infrastructure (Years 1–4) – refer to Figure 3.5 of Volume 2, Chapter 3 of the ES.				
Borrow pit excavation.	Excavation from borrow pits is required to source construction materials. It would also be necessary to import good quality	Import all material onto site.	Remove the requirement for on-site borrow pits by importing fill materials and exporting.	Has potential to reduce the noise and visual stimuli by reducing the extent of earthworks required on-site.
		Excavate borrow pits elsewhere on-site.	Locate the borrow pits elsewhere on-site.	Has potential to reduce the noise and visual stimuli by reducing the extent of

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
	engineering material by either rail or road to supplement that sourced from borrow pits.			earthworks required on-site.
		Amend the proportion of material sourced from on-site and off-site sources.	Reduce the size of the on-site borrow pits and import more material from off-site sources.	Has potential to reduce the noise and visual disturbance by reducing the extent of on-site earthworks.
Borrow pit stockpiling.	Stockpiles are proposed to be used on-site to manage construction materials within the space that is available.	Alternative locations for the stockpiles.	Locate elsewhere on-site.	See footnote ⁹ .
Entrance plaza.	The main development site would be arranged as a secure construction site with controls on the people and materials entering and leaving the site. The site entrance hub would be located east of the new roundabout off the B1122.	Alternative layout for the entrance plaza.	Permanent diversion of Eastbridge Road to form a new independent access off the B1122 near to Greenhouse Plantation. The roundabout would have four arms: the B1122 north towards Theberton; Sizewell C construction workers' entrance; Sizewell C freight entrance and the B1122 south towards Leiston.	Significant changes to the noise and visual disturbance impacts are unlikely as similar construction works would still be required for this option.
		Alternative locations for the entrance plaza.	Locate elsewhere on-site.	See footnote ⁹ .
Main site office – superstructure.	Construction of the site superstructure for the site office.	Alternative locations for the main site office.	Locate elsewhere on-site.	See footnote ⁹ .
Contractors compound – hardstanding.	Erection of a contractor's compound using hardstanding.	Alternative solutions for ground protection works.	Do not use hardstanding during erection of the compound.	Has potential to reduce the noise and visual disturbance as one element of the construction process would be removed.
Accommodation campus –	Construction of an on-site accommodation campus to	Do not construct an accommodation	Accommodate workers in existing	Has potential to reduce the noise and visual disturbance as the accommodation

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
groundworks, car parks, buildings.	the north of the site entrance hub, on the east side of Eastbridge Road.	campus.	accommodation.	campus would not be required.
		Provision of multiple campuses.	Construct a number of smaller campuses.	Significant changes to the noise and visual disturbance impacts are unlikely as similar construction works would be required for this option.
		Locate the site accommodation at Sizewell Gap.	Construct the site accommodation approximately 2.4km from the main development site entrance at Sizewell Gap.	Has potential to reduce the noise and visual disturbance.
		Locate the site accommodation at Leiston East.	Construct the site accommodation approximately 2.7km from the main development site entrance at Leiston East.	Has potential to reduce the noise and visual disturbance.
		Locate the accommodation campus to the east and west of Eastbridge Road.	Locate the accommodation campus on both sides of the Eastbridge Road.	Significant changes to the noise and visual disturbance impacts are unlikely as similar construction works would be required for this option.
Within cut off wall – excavation.	Undertake excavation works to remove unsuitable materials.	Do not undertake excavation works.	The excavation works within the cut off wall are essential in order to remove unsuitable materials from the area. As the location of the cut off wall is driven by the works undertaken in Phase 1, there is no alternative to relocate the location of these excavation works within the Order Limits. The only real alternative therefore is to not undertake the excavation works.	Has potential to reduce the noise and visual disturbance by reducing the earthworks.

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
Haul route (use of the haul route).	A haul road would be used to transport materials around the site.	As the haul route would have been constructed during Phase 1, the only possible alternative is to not use the haul route. The transport of all material to site by sea or rail would still require the onward transport of such material onto and around the site using haul roads. The alternative of not using the haul roads is therefore not possible, as haul roads are a fundamental requirement of the construction project. There are therefore no alternatives to this activity and therefore this has not been considered further.		
Railhead operation. –	Operation of the railhead within the main development site to allow import and export of materials by rail.	As the rail head would have been constructed during Phase 1, the only possible alternative is to not use the rail head, and transport materials to site by alternative means.	Delivery of all materials to and from site by sea.	Has potential to reduce the noise and visual disturbance by removing the need to operate a railhead, however there would be noise and visual disturbance associated with the construction of a jetty to facilitate this alternative.
			Delivery of all materials to and from site by road.	Has potential to reduce the noise and visual disturbance by removing the need to operate the rail head, however the movement of an increased number of HGVs to site would also result in noise and visual disturbance.
Main works yard.	Erection of a main works yard within the main development site.	Alternative locations for the main works yard.	Locate main works yard elsewhere on-site.	See footnote ⁹ .
Phase 3 activities: main civils (Years 3-9); Phase 4 activities: mechanical and electrical installation (Years 4-11) – refer to Figure 3.6 and Figure 3.7 of Volume 2, Chapter 3 of the ES.				
CRF ¹¹ pipes and backfill.	Construction of a power station at Sizewell C, which	NPS EN-6 (Ref. 1.12) identifies part of the main development site at Sizewell as one of a small number of sites in the UK that the Government considers to be 'potentially suitable' for the deployment of new nuclear power stations. The main		

¹¹ CRF pipes are the main cooling water pipes that take water to/from the condensers in the turbine hall. CRF is not an abbreviation, it is a 3-digit code for the cooling water system

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
Base slab and substructure.	requires all of these features.	platform is located within the listed site and would contain the power station, including the CRF pipes, base slab, nuclear islands, galleries, turbine hall, outfall excavation and service water pump building walls. As such, the principle of nuclear power generation on the main platform is established, through the NPS process. In addition, the location of the proposed Sizewell C power station, to the north of the existing Sizewell B power station, is indicated in plans appended to NPS EN-6 (Ref. 1.12). The design of the main development site has been underpinned by a strategy to screen lower lying buildings in views from the publicly accessible coastline using the proposed sea defences and establish the turbine halls as the main feature on a continuous north-south building line, established by Sizewell B. It is therefore concluded that there are no alternatives for locating the main platform, and therefore these Sizewell C Project activities, elsewhere within the Order Limits. There are no alternatives to these activities as all are required as part of the proposed power station and therefore they have not been considered further.		
Nuclear islands.				
Turbine hall.				
Service water pump building walls.				
Outfall excavation.				
Galleries				
Forebay base.	Construct forebays as rectangular features.	Alternative designs for the forebays.	Construct the forebays as semi-circular features.	Unlikely to significantly change the noise and visual disturbance impact as both options require excavation and construction of forebays.
Hall route.	Use of haul routes to support the construction works.	As the haul route would have been constructed during Phase 1, the only possible alternative is to not use the haul route. The transport of all material to site by sea or rail would still require the onward transport of such material onto and around the site using haul roads. The alternative of not using the haul roads is therefore not possible, as haul roads are a fundamental requirement of the construction project. There are therefore no alternatives to this activity and therefore this has not been considered further.		
Stockpiling	Use of on-site stockpiles to support the construction works.	Alternative locations for the stockpiles.	Locate elsewhere on-site.	See footnote ⁹ .
Compounds	Use of a compound to support the construction works.	As the compounds have been constructed during the previous phases for use in later phases, there are no alternative solutions to	Not applicable.	Not applicable.

NOT PROTECTIVELY MARKED

Potential Alternative	Approach Included Within the DCO Application	Potential Alternative Solution	Further Details	Effect on the Potential for Harm on the SPA and Ramsar Site
		consider in this respect.		
Operational railhead.	Use of a railhead within the main development site to allow import and export of materials by rail.	As the rail head would have been constructed during Phase 1, the only possible alternative is to not use the rail head, and transport materials to site by alternative means.	Delivery of all materials to and from site by sea.	Has potential to reduce the noise and visual disturbance by removing the need to construct and operate a railhead, however there would be noise and visual disturbance associated with the construction of a jetty to facilitate this alternative.
			Delivery of all materials to and from site by road.	Has potential to reduce the noise and visual disturbance by removing the need to operate the rail head.
LEEIE construction – refer to Figure 3.4 – Figure 3.8 of Volume 2, Chapter 3 of the ES.				
The works to be undertaken at LEEIE are located to the south of the Sizewell Marshes SSSI. Such activities would not, therefore, contribute to the predicted barrier effect to foraging marsh harriers between the Sizewell Marshes SSSI and the Minsmere-Walberwick SPA and Ramsar site. For this reason, alternative solutions to the proposed activities at LEEIE have not been considered further.				
Phase 5 activities: commissioning and land restoration (Years 10-12) – refer to Figure 3.8 of Volume 2, Chapter 3 of the ES.				
Commissioning and restoration.	Undertake commissioning and restoration of the site.	The commissioning and restoration activites would be undertaken across the site as required. The extent of restoration required would be linked to the construction footprint. A rearrangement of the features within the DCO boundary could have an influence on the amount of restoration required, but ultimately all land within the DCO boundary is needed to allow construction of the power station, and therefore restoration will be required within the site boundary. There are no alternatives to this activity and restoration has not been considered further.		

5.3 Screening the long list of potential alternative solutions

5.3.1 This section assesses whether the potential alternative solutions set out in **Table 5.1** could meet or deliver the Sizewell C Project need as defined in **section 3.2** of this report, and the Sizewell C Project objectives as detailed in **Table 3.1**.

5.3.2 **Table 5.2** presents the findings of the screening exercise.

Table 5.2: Screening the long list of potential alternative solutions

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
1. Do nothing – do not construct a power station.	No	No	This option would be contrary to national policy. The need for new nuclear power stations is set out in NPS EN-1 (Ref. 1.11), with the need for a new power station at Sizewell C covered in NPS EN-6 (Ref. 1.12), as summarised in section 3.2 of this report and described more fully in the Planning Statement (Doc Ref. 8.4) and Shadow HRA Report, Volume 3: Stage 4 IROPI (Doc Ref. 5.10). The Government continues to give its strong in principle support to project proposals at the sites listed in NPS EN-6 (Ref. 1.12), including at Sizewell C. Not progressing with a power station at Sizewell would, therefore, not meet the Sizewell C Project need or objectives.	No
2. Alternative locations – locate the power station elsewhere in the UK.	No	No	<p>This option would be contrary to national policy. NPS EN-6 (Ref. 1.12) explains that all eight sites that made it through the NPS site selection appraisal are required, as summarised in section 3.2 of this report and described more fully in the Planning Statement and Shadow HRA Report, Volume 3: Stage 4 IROPI (Doc Ref. 5.10). Although it is no longer possible for deployment of Sizewell C to take place by the end of 2025, the Ministerial Statement on Energy Infrastructure published on 7 December 2017 ('2017 Ministerial Statement') (Ref. 1.27) states that for projects yet to apply for development consent and due to deploy beyond 2025, the Government continues to give its strong in principle support to proposals at those sites currently listed in NPS EN-6 (Ref. 1.12). Constructing the power station at a different site would therefore not meet the Sizewell C Project need.</p> <p>The location of the Sizewell C power station, to the north of the existing Sizewell B power station, and the approximate location of the temporary construction area for the main development site are indicated in plans appended to NPS EN-6 (Ref. 1.12).</p> <p>The existing site boundary is heavily constrained by Sizewell B to the south, the Sizewell Marshes SSSI to the west, the North Sea to the east and the Minsmere-Walberswick SPA and Ramsar site to the north.</p>	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			<p>There is therefore very limited potential to vary the location of the boundary of the main development site within the local area.</p> <p>Objective 24 refers specifically to the development of a power station at Sizewell C (in the context of making a major contribution to the nation's low carbon energy needs, in a manner consistent with the highest standards of nuclear safety, reliability and sustainability). By constructing a power station elsewhere in the UK, this Sizewell C Project objective would not be met.</p>	
3. Alternative scales – construct one EPR™ unit (rather than the proposed two).	No	No	<p>The need for low carbon electricity generation is explained in NPS EN-1 (Ref. 1.11) and NPS EN-6 (Ref. 1.12). As detailed in the Shadow HRA Report, Volume 3: Stage 4 IROPI (Doc Ref. 5.10), the demand for electricity in the UK continues to grow (with a 20% increase in demand forecast by 2035 (Ref. 1.13), despite energy conservation and efficiency, and significant electricity capacity is set to be retired by 2035. Consequently, there will be generational shortfall which will amount to 95GW by 2035 (Ref. 1.14). The required scale of nuclear new build has been confirmed by a number of sources, including the Energy Research Partnership, which has shown that 20GW-25GW is required, even if the National Renewable Energy Action Plan target for wind is met (Ref. 1.15). By constructing a power station with only one EPR™ unit, the Sizewell C Project need would not be met.</p> <p>Sizewell C Project objective 24 refers specifically to the development of a power station that would make a major contribution to the nation's low carbon energy needs. By constructing only one unit, this Sizewell C Project objective would not be met. In addition, the highest standards of nuclear safety would be obtained by directly replicating the design from Hinkley Point C, which is a design for two units. This is also relevant to objective 24.</p>	No
4. Seasonal restrictions –	No	No	As detailed in the Shadow HRA Report (Doc Ref. 5.10), marsh harrier egg laying typically takes place from mid-April to early-May each year. Laying takes place every two to three days. Incubation is	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
undertake works outside of the most sensitive periods for marsh harrier foraging.			<p>undertaken primarily by the female and this lasts 31-38 days. Fledging occurs after a period of 35-45 days and young are dependent on the adults for a further 15-25 days.</p> <p>The construction disturbance effects do not extend to the marsh harrier nesting area and would only act to (potentially) limit access to areas of foraging habitat. Demands for foraging resources are likely to be greatest during chick-rearing and possibly into the post-fledging phase, so that constraints in terms of the availability of foraging habitat would be greatest at those times.</p> <p>This alternative solution would require construction works to cease every year of the proposed construction phase during June and July (taken to be the most sensitive foraging times based on the information within the Shadow HRA Report (Doc Ref. 5.10). Such a restriction would result in a significant delay to the overall construction programme and significant technical and commercial challenges would arise. For example, there are construction processes which could not accommodate programme restrictions, such as the concrete pours for construction of the cut off wall. Once a concrete pour has started for a cut off wall, if the concrete supply is disrupted (due to a seasonal restriction on working, for example), it would not be possible to create a robust water-tight construction joint and the cut off wall would not function as intended.</p> <p>Although ultimately the power station would be constructed, the extended construction schedule caused by the seasonal restrictions would delay the provision of low carbon electricity by between 18 months and two years and the Sizewell C Project need (i.e. contributing to addressing the UK's predicted shortfall in energy generation capacity of 95GW by 2035) would not be met.</p> <p>The extension to the programme caused due to seasonal restrictions on working would also result in disturbance to the local community and ecological receptors for a longer period of time. Therefore, it would not deliver the following objectives due to the prolonged construction period:</p> <ul style="list-style-type: none"> • Objective 8 – 'To minimise impacts on tourism' (due to the extended construction programme). • Objective 22 – 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting' (due to the extended construction programme). 	

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
5. Phasing the construction works – undertaking each construction phase in series.	No	No	Undertaking each construction phase in series would result in an extension to the overall construction programme of greater than 12 months and, therefore, the Sizewell C Project need would not be met. Extending the construction programme would also subject the local community and ecological receptors to construction related disturbance for a greater period of time. The following objectives would not be met due to the prolonged construction period: <ul style="list-style-type: none">Objective 8 – ‘To minimise impacts on tourism’ (due to the extended construction programme).Objective 22 – ‘To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting’ (due to the extended construction programme).	No
6. Alternative construction methods / locations for construction activities.	The alternative construction methods / locations to each of the construction phase activities as detailed within the construction phase noise assessment, as provided in Appendix 11B of Volume 2 of the ES are assessed below.			
Phase 1 activities: site establishment and preparation for earthworks (Years 1-2).				
Water management zone – locate elsewhere on-site.	Yes	Yes	See footnote ¹² .	Yes
Borrow pit excavation – remove the	No	No	The proposed scheme requires the excavation of alluvial peat and clays that are unsuitable for re-use on the main platform. Granular material excavated from the borrow pits would be utilised as suitable backfill	No

¹² Assuming the site could be re-modelled to accommodate this activity elsewhere within the Order Limits, the Sizewell C Project need and objectives would be met with this alternative because it would still be delivered in broadly the same way as currently proposed.

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
requirement for on-site borrow pits by importing fill materials onto site.			<p>for the Sizewell C Project, with import of good quality engineering material to achieve the necessary backfill compaction and engineering properties.</p> <p>Early design studies identified that the import of material by sea would require the construction of a large jetty. Construction of such a jetty would result in significant changes to coastal processes and would also have impacts on marine mammals as a result of piling during construction. Measures required to reduce the predicted impacts (i.e. seasonal restrictions on construction works for the jetty) would significantly increase the overall time taken to construct the power station (by greater than 12 months), which would not meet the “urgent” need for new nuclear power identified by Government in the Nuclear Power Generation National Policy Statement (NPS EN – 6). The Sizewell C Project need, therefore, would not be met.</p> <p>Importing all material onto site would result in greater levels of disturbance to the local community, due to the movement of trucks, locomotives or vessels (which, based on early design studies, would require construction of a jetty). In addition, there are limitations on the current transport networks in the area which would limit the volumes of materials that could be transported onto site.</p> <p>This would result in the following Sizewell C Project objectives not being met:</p> <ul style="list-style-type: none"> • Objective 1: ‘To minimise impacts on biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.’ • Objective 2: ‘To avoid adverse impacts on valuable ecological networks and ecosystem functionality’. • Objective 7: ‘To minimise impacts on coastal processes beyond the bounds of the shores fronting the site, through appropriate engineering design and coastal management.’ • Objective 22: ‘To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting’. <p>The import of material to site is less sustainable than sourcing material from site. The following Sizewell C Project objectives would therefore not be met by importing material onto site:</p>	

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			<ul style="list-style-type: none"> Objective 26: 'To promote the sustainable use of materials'. Objective 35: 'To promote the use of sustainable methods of construction, including materials, energy efficiency, water recycling, aspect etc.' <p>In addition, excavating materials from borrow pits results in the provision of space for the placement of soils which are unsuitable for use within the Sizewell C Project. Should all material be imported rather than utilising material from on-site borrow pits, there would be a requirement to transport soils which are unsuitable for use off-site, either by sea, rail or road. The transport of materials off-site via road and rail is considered unlikely to meet the following Sizewell C Project objectives, due to the disturbance this would generate:</p> <ul style="list-style-type: none"> Objective 8 – 'To minimise impacts on tourism.' Objective 10 – 'To minimise disruption of basic services and community infrastructure, including emergency services.' Objective 22 – 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' 	
Borrow pit excavation – locate the borrow pits elsewhere on-site.	Yes	No	<p>On the assumption that the site could be rearranged to accommodate borrow pits elsewhere, the Sizewell C need would be met as the power station could still be constructed.</p> <p>SZC Co. has considered a number of different options for the borrow pit locations, as defined within the pre-application consultation documentation. During the Stage 2 consultation, four fields, totalling 40ha within the north-west of the main development site were considered as potential locations for borrow pits. It was estimated at that time that approximately 15ha of land would be required but, due to each of the fields measuring less than 15ha and the practicalities of the borrow pit operation, three combinations of those four fields were considered. Those were fields one and two (east and west of Eastbridge Road), fields two and three (east of Eastbridge Road and north of Ash Wood), or fields three and four (north and west of Ash Wood).</p>	No

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			<p>Field one was discounted as it is the most visually exposed of the four fields. It would be visible from the north including from the public rights of way south of Eastbridge, and has intermittent views from Eastbridge Road. Potters Farm, Eastbridge Farm and Leiston Abbey are also nearby, and are likely to have had direct views of this borrow pit if it was progressed. Field one would also have required large construction vehicles to cross Eastbridge Road. Whilst it is the only borrow pit option that is not in the AONB, for the above reasons SZC Co. considered that use of this field was the least appropriate solution for borrow pit construction works. The following objectives would not be met with regard to field one:</p> <ul style="list-style-type: none"> • Objective 8: 'To minimise impacts on tourism.' • Objective 15: 'To minimise impacts on landscape character, quality and tranquillity, diversity and distinctiveness.' • Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' • Objective 23: 'To minimise loss of access to recreational opportunities, their quality and user convenience, and to enhance these where possible.' • Objective 31: 'To minimise adverse impacts on the function and efficiency of strategic transport infrastructure and to enhance this infrastructure where feasible.' <p>Whilst the options presented at Stage 2 identified that two borrow pit fields are likely to be required, further consideration on a precautionary basis has led to a conclusion that the remaining three borrow pit fields should be included in the application for development consent to ensure that sufficient suitable material is available for the main construction area.</p>	
Borrow pit excavation – reduce the size of the on-site borrow pits and import more	Yes (if brought onto site by rail / road).	No	The proposed scheme requires the excavation of alluvial peat and clays that are unsuitable for re-use on the main platform. Granular material excavated from the borrow pits would be used as backfill for the main platform, with import of good quality engineering material to achieve the necessary backfill compaction and engineering properties. Reducing the size of the borrow pits and importing more material onto site by road	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
material from off-site.	No (if brought onto site by sea)		<p>or rail would still result in the Sizewell C Project need being met.</p> <p>However, as noted above, transporting material onto site by sea would require the construction of a jetty. The construction of a jetty would not meet the construction schedule, and would result in significant environmental impacts associated with the installation of piles for the jetty (underwater and airborne noise and habitat loss within the footprint of the piles). The Sizewell C Project need would not be met should material be brought onto site by sea.</p> <p>As noted above, excavating materials from borrow pits results in the provision of space for the placement of soils which are unsuitable for re-use within the Sizewell C Project. Reducing the size of the borrow pits would likely result in a surplus of material on-site, requiring off-site disposal by sea, rail or road. The transport of materials off-site via road and rail is considered unlikely to meet the following objectives, due to the disturbance this would generate:</p> <ul style="list-style-type: none"> • Objective 8 – ‘To minimise impacts on tourism.’ • Objective 10 – ‘To minimise disruption of basic services and community infrastructure, including emergency services.’ • Objective 22 – ‘To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.’ <p>The transport of materials off-site via sea would not meet the following Sizewell C Project objectives given the requirement to install piles for the jetty within the Southern North Sea Special Area of Conservation (SAC) and Outer Thames Estuary SPA:</p> <ul style="list-style-type: none"> • Objective 1: ‘To minimise impacts on biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.’ • Objective 2: ‘To avoid adverse impacts on valuable ecological networks and ecosystem functionality’. 	

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
Borrow pit stockpiling – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Borrow pit stockpiling – ship excavated material to the RSPB Wallasea Island Wild Coast Project.	No	No	<p>This approach would require the use of a jetty to export materials from site. As detailed above, construction of jetty would not meet the Sizewell C Project need or the objectives.</p> <p>SZC Co. is satisfied that it can sensitively incorporate material on-site as part of the land restoration works and that this approach is more sustainable than shipping the material off-site. The following objectives would not be met by exporting material off-site (as there is a more sustainable option which is being included within the DCO application, namely keeping the material on-site where possible):</p> <ul style="list-style-type: none"> Objective 26: 'To promote the sustainable use of materials.' Objective 35: 'To promote the use of sustainable methods of construction, including materials, energy efficiency, water recycling, aspect etc.' 	No
Contractors compound – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Culvert and embankment construction – construct a single span bridge with vertical wing walls.	Yes	No	<p>The power station would still be built with the single span bridge approach and, therefore, the Sizewell C Project need would be met. This option would require a short-term bridge to be constructed in the location of the permanent bridge. At the same time a temporary bridge would be erected alongside the short-term bridge. Once the construction of the temporary bridge is complete, the short-term bridge would be dismantled and the permanent bridge would be erected in its place. On completion of construction the temporary bridge would be removed.</p> <p>This option would therefore require multiple phases of work, which would expose receptors to disturbance for prolonged periods of time in comparison to alternative solutions. Although the Sizewell C Project need</p>	No

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			would be met, it is concluded that the following objectives would not be met (due to the repeated disturbance impacts that would be generated): <ul style="list-style-type: none"> Objective 1: 'To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.' Objective 2: 'To avoid adverse impacts on valuable ecological networks and ecosystem functionality'. 	
Culvert and embankment construction – construct a three span bridge.	Yes	No	As above.	No
Culvert and embankment construction – causeway over the culvert with adjacent short-term bridge.	Yes	No	As above.	No
Culvert and embankment construction – do not construct a culvert or embankment and access the construction area	No	Yes	The existing access road would not be able to provide the regular capacity required during both the construction and operational phases, due to its routing past Sizewell B. The Sizewell C Project need, therefore, would not be met, as the power station ultimately could not be built given the capacity restrictions on the existing road.	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
from the south using existing access roads at Sizewell A and B.				
SSSI crossing – locate the SSSI crossing in the north-west corner of the main platform.	Yes	No	<p>The power station would still be constructed using this alternative solution and, therefore, the Sizewell C Project need would be met.</p> <p>However, this solution would result in a greater impact on the Sizewell Marshes SSSI in terms of land take when compared to the solution included within the DCO application. This alternative solution, therefore, would not be in accordance with the following objective:</p> <ul style="list-style-type: none"> Objective 1: 'To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.' 	No
Haul roads – delivery of material to and from site by sea via a wide jetty or narrow jetty.	No	No	<p>As detailed above, construction of a jetty would not meet the Sizewell C Project need or the objectives. In addition, the following Sizewell C Project objectives would not be met for both wide and narrow jetty options, given they would require a jetty to be constructed within the Outer Thames Estuary SPA and Southern North Sea SAC:</p> <ul style="list-style-type: none"> Objective 1: 'To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.' Objective 2: 'To avoid adverse impacts on valuable ecological networks and ecosystem functionality'. <p>SZC Co. discounted narrow and wide jetty options following Stage 2 consultation and progressed with a BLF, in order to retain the ability to deliver AILs by sea that would be too large to be delivered by road or rail. The decision was informed by design development and environmental work, and SZC Co.'s experiences from the construction of Hinkley Point C.</p>	No
Haul roads – locate	Yes	Yes	See footnote ¹¹ .	Yes

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
elsewhere on-site.				
Main access road – use of the existing Sizewell Power station complex access road.	No	No	<p>The existing access road would not be able to provide the regular capacity required during both the construction and operational phases, due to its routing past Sizewell B. The Sizewell C Project need therefore would not be met, as the power station ultimately could not be built given the capacity restrictions on the existing road.</p> <p>In addition, objective 24 requires the delivery of the power station to the highest standards of nuclear safety. Attempting to construct a new power station using existing road infrastructure via an operational nuclear power station which does not provide the necessary capacity does not comply with this objective.</p>	No
Main access road – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Main site offices – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Main site offices – do not use piles for foundations.	Yes	Yes	The power station could still be constructed using this alternative and, therefore, the Sizewell C Project need would be met. The removal of piles from the construction method would also remove a source of noise and visual disturbance, and would not conflict with any of the Sizewell C Project objectives.	Yes
Entrance plaza – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Concrete batching plant ground preparation – import	Yes	No	The concrete for the permanent works requires a very high specification, available only from specific locations. Assuming a suitable facility can be found to manufacture concrete of a suitable specification, importing all concrete onto site rather than generating from the on-site batching plants would still result in	No

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
concrete from off-site to avoid the need for ground preparation for the plant.			the Sizewell C Project need being met. The import of concrete by road would result in disturbance to the local community, which would not meet objective 22 (minimise impact of nuisance on local communities, including from air quality, noise, vibration and lighting).	
Concrete batching plant ground preparation – locate the batching plant elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Sea defences – construction of groynes.	Yes	No	<p>While the level of coastal protection provided by this potential alternative has not been assessed in detail, for the purposes of examining potentially feasible alternative solutions, it is assumed that this approach could deliver a suitable standard of protection. The Sizewell C Project need, therefore, would be met (indirectly) as a result of this alternative.</p> <p>A groyne field has potential to result in permanent changes to hydrodynamic and sedimentary regime, far beyond the shores fronting the site. In addition, a groyne field would represent a change to the landscape character of the coastline, and would need to be constructed within the Outer Thames Estuary SPA and the Southern North Sea SAC. Based on the above, the following objectives would not be met:</p> <ul style="list-style-type: none"> Objective 1: 'To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible.' Objective 2: 'To avoid adverse impacts on valuable ecological networks and ecosystem functionality.' Objective 7: 'To minimise impacts on coastal processes beyond the bounds of the shores fronting the site, through appropriate engineering design and coastal management.' Objective 15: 'To minimise impacts on landscape character, quality and tranquillity, diversity and 	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			distinctiveness.'	
Sea defences – construction of an offshore breakwater.	Yes	No	<p>While the level of coastal protection provided by this potential alternative has not been assessed in detail, for the purposes of examining potentially feasible alternative solutions, it is assumed that this approach could deliver a suitable standard of protection. The Sizewell C Project need would therefore be met (indirectly) as a result of this alternative.</p> <p>An offshore breakwater has potential to result in permanent changes to hydrodynamic and sedimentary regime. In addition, the construction of an offshore breakwater would result in the loss of subtidal habitat within the footprint of the breakwater, which would be located within the Outer Thames Estuary SPA and the Southern North Sea SAC. In addition, the construction of an offshore breakwater is likely to change the landscape value of the frontage. Based on the above, the following objectives would not be met:</p> <ul style="list-style-type: none"> Objective 1: 'To minimise impacts to biodiversity, particularly international and nationally important sites, habitats and species, and enhance these where possible).' Objective 2: 'To avoid adverse impacts on valuable ecological networks and ecosystem functionality.' Objective 7: 'To minimise impacts on coastal processes beyond the bounds of the shores fronting the site, through appropriate engineering design and coastal management.' Objective 15: 'To minimise impacts on landscape character, quality and tranquillity, diversity and distinctiveness.' 	No
Cut off wall – use of a concrete pumped ring main.	Yes	Yes	<p>The power station could still be constructed using this alternative solution and therefore the Sizewell C Project need would be met.</p> <p>This alternative solution would reduce the need for the import of concrete via trucks, and therefore, represents a less disruptive (from a noise and visual perspective) solution. There would therefore be direct compliance with a number of objectives as a result of this option.</p>	Yes

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
Cut off wall – used of prefabricated cages (manufactured off-site) to stabilise the cut off wall trench.	Yes	No	<p>Prefabricated cages could be manufactured off-site and transported to site (via a very large AIL movement) at a suitable point in time to allow the construction of the cut off wall to continue. The Sizewell C Project need would therefore be met as a result of this option.</p> <p>The transport of cages would however contribute to the levels of disturbance to the local community associated with the movement of trucks of the local highway network. The movement of trucks on the highway network would also result in the generation of greenhouse gas emissions. This alternative solution would therefore not meet the following objectives:</p> <ul style="list-style-type: none"> Objective 5: 'To minimise greenhouse gas emissions.' Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' 	No
Phase 2 activities: main development site earthworks and completion of temporary infrastructure (Years 1–4).				
Borrow pit excavation – remove the requirement for on-site borrow pits by importing fill materials onto site.	Yes	No	Refer to relevant text above from Phase 1.	No
Borrow pit excavation – locate elsewhere on-site.	Yes	No	Refer to relevant text above from Phase 1.	No
Borrow pit excavation – reduce the size of the on-site borrow	Yes	No	Refer to relevant text above from Phase 1.	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
pits and import more material from off-site.				
Borrow pit stockpiling – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Entrance plaza – permanent diversion of Eastbridge Road to form a new independent access off the B1122 near to Greenhouse Plantation. Creation of a new four armed roundabout.	Yes	No	<p>The power station could still be constructed with this alternative solution and therefore the Sizewell C Project need would be met.</p> <p>This option would require a permanent diversion of Eastbridge Road, causing direct disturbance / nuisance to users of the local highway network. The solution included within the DCO application reduces the extent of diversion works needed and allows direct access to the village from the roundabout. This alternative solution would therefore not comply with the following objectives:</p> <ul style="list-style-type: none"> Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' Objective 31: 'To minimise adverse impacts on the function and efficiency of strategic transport infrastructure and to enhance this infrastructure where feasible.' 	No
Entrance plaza – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Main site office, superstructure – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Contractors	Yes	Yes	The power station could still be constructed using this alternative and, therefore, the Sizewell C Project	Yes

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
compound, hardstanding – do not use hardstanding during erection of the compound.			need would be met. The removal of hardstanding from the compound would remove a source of noise and visual disturbance, and would not contravene any of the objectives.	
Accommodation campus – accommodate workers in existing accommodation.	Yes	No	<p>The power station could still be constructed if this alternative solution was progressed and, therefore, the Sizewell C Project need would be met.</p> <p>The construction of Sizewell C would require up to 7,900 workers at the peak. It is estimated that 2,016 workers would be home-based, with the remainder (5,884) being non-home-based and requiring accommodation on campus, in caravan or living off-site. In addition, all 600 associated development workers are assumed to be home-based.</p> <p>There are a number of reasons for using existing accommodation sources to meet the accommodation demand of the Sizewell C Project, namely:</p> <ul style="list-style-type: none"> • Potential to deliver direct economic benefit to local accommodation providers, and indirect benefits for other businesses in the local area. • The demand created by the Sizewell C Project should help stimulate improvements in the existing housing and tourist stock generating legacy benefits. • Using existing accommodation that is not fully occupied is responsible, cost efficient and sustainable. <p>This alternative would, therefore, comply with the following objectives:</p> <ul style="list-style-type: none"> • Objective 11: 'To encourage development of sustainable communities.' • Objective 17: 'To create employment opportunities.' • Objective 18: 'To encourage inward investment.' 	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			<ul style="list-style-type: none"> Objective 26: 'To promote the sustainable use of materials.' <p>The Accommodation Strategy (Doc Ref. 8.10) has undertaken a detailed assessment of accommodation capacity in the local area. This has confirmed that there may be some localised effects at the peak of construction, on availability of accommodation in the private rental sector and tourist sectors, particularly in areas to the east of the A12 road. In terms of effects on the private rental sector, at peak there may be demand for between 990 and 1,200 bedspaces from Sizewell C construction workers. This would in some cases exceed the 'frictional vacancy' within the sector estimated in the affected wards. Based on the assessment of accommodation capacity, there is a clear need to provide additional accommodation to meet the needs of the non-home-based workforce.</p> <p>It is therefore concluded that the following objectives would not be met via this option:</p> <ul style="list-style-type: none"> Objective 8: 'To minimise impacts on tourism' (potential displacement of tourists). Objective 21: 'To minimise impacts on physical and mental health' (minimising travel time from existing accommodation off-site has potential to enhance physical and mental health, and therefore utilising existing accommodation is likely to contravene this objective, as workers would be required to travel to work). Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting' (potential displacement of local residents). 	
Accommodation campus – construct a number of smaller campuses.	Yes	No	<p>The power station could still be constructed with this alternative solution and, therefore, the Sizewell C Project need would be met.</p> <p>Volume 1, Chapter 4 of the ES (Doc Ref. 6.2) provides a comprehensive justification for ruling out the option of multiple accommodation campuses. In summary, a multiple-campus option would spread the workforce across a wider area and increase the difficulty in managing effects on those communities, as well as increasing traffic through more (and longer) bus journeys across multiple shifts. The following objectives would not be met:</p>	No

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
			<ul style="list-style-type: none"> Objective 10: 'To minimise disruption of basic services and community infrastructure, including emergency services' (due to the presence of multiple campuses in the local area and the disruption this would cause to local communities). Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' 	
Accommodation campus – construct the site accommodation at Sizewell Gap (off-site).	Yes	No	<p>The power station could still be constructed with this alternative solution and, therefore, the Sizewell C Project need would be met.</p> <p>As set out in Volume 1, Chapter 4 of the ES, the strategic decision was made to progress a single accommodation campus in close proximity to the main development site.</p> <p>On-site accommodation offers a number of benefits, notably reduced number of journeys on local roads and travelling time to and from the construction site; increased productivity and reduced health and safety risks associated with long travel and work times; and flexibility in terms of the out of hours working that may be necessary to respond to emerging site needs and maintain construction productivity and progress. It is therefore concluded that the following objectives would not be met as a result of these alternative off-site campus solutions:</p> <ul style="list-style-type: none"> Objective 10: 'To minimise disruption of basic services and community infrastructure, including emergency services.' Objective 21: 'To minimise impacts on physical and mental health.' Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' 	No
Accommodation campus – construct the site accommodation at Leiston East (off-site).	Yes	No	<ul style="list-style-type: none"> Objective 10: 'To minimise disruption of basic services and community infrastructure, including emergency services.' Objective 21: 'To minimise impacts on physical and mental health.' Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting.' 	No
Accommodation campus – locate the accommodation campus on both sides	Yes	No	<p>The power station could still be constructed with this alternative solution and, therefore, the Sizewell C Project need would be met.</p> <p>This alternative solution would require a realignment of Eastbridge Road which would cause disturbance to</p>	No

NOT PROTECTIVELY MARKED

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
of Eastbridge Road.			<p>the local community. In addition, locating the campus partly on the western side of Eastbridge Road would result in impacts on heritage features and landscape and visual disturbance on the approach to Eastbridge. The following objectives would therefore not be met with this option:</p> <ul style="list-style-type: none"> Objective 12: 'To minimise impacts on internationally and nationally important features of the historic environment.' Objective 13: 'To minimise impacts on the setting and quality of built heritage, archaeology and historic landscapes.' Objective 15: 'To minimise impacts on landscape character, quality and tranquillity, diversity and distinctiveness.' 	
Within cut-off wall excavation – do not undertake excavation.	No	No	<p>The construction of Sizewell C requires deep excavations on the main platform to remove unsuitable materials. The option of not undertaking the excavation works, therefore, would not meet the Sizewell C Project need (as the power station could not be constructed). The following objective would also not be met:</p> <ul style="list-style-type: none"> Objective 24: 'To deliver the highest standards of nuclear safety.' 	No
Railhead, operation – delivery of materials to and from site by sea rather than using rail.	No	No	Refer to relevant text above from Phase 1.	No
Railhead, operation – delivery of materials to and from site by road rather than	Yes	No	<p>The power station could still be constructed using this alternative and, therefore, the Sizewell C Project need would be met.</p> <p>However, the option of not using the railhead would result in significantly more HGVs on the highway network. This would represent a conflict with the following objectives:</p>	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
using rail.			<ul style="list-style-type: none"> Objective 5: 'To minimise greenhouse gas emissions' (due to more HGVs on the highway network). Objective 21: 'To minimise impacts on physical and mental health' (due to significantly more HGVs travelling through local communities). Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting' (due to significantly more HGVs on the local highway network). <p>It should be noted that this does not mean that the option of delivering materials to and from site by road is unacceptable; this simply concludes that this alternative represents a conflict with the objectives defined for the purposes of this report.</p>	
Main works yard – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Phase 3 activities: main civils (Years 3-9); Phase 4 activities: mechanical and electrical installation (Years 4-11).				
Forebay base – construct the forebays as semi-circular features.	Yes	Yes	<p>The power station could still be constructed with this alternative solution and therefore the Sizewell C Project need would be met.</p> <p>Constructing the forebays as semi-circular shapes would not conflict with any of the Sizewell C Project objectives.</p>	Yes
Stockpiling – locate elsewhere on-site.	Yes	Yes	See footnote ¹¹ .	Yes
Operational railhead – delivery of all materials to and from site by sea.	No	No	Refer to relevant text above from Phase 1.	No

Potential Alternative Solutions	Does the Option Meet/Deliver the Sizewell C Project Need?	Does the Option Meet/Deliver the Sizewell C Project objectives?	Why and How?	Take to Step 4? (i.e. Passes Step 3?)
Operational railhead – delivery of all materials to and from site by road.	Yes	No	<p>The power station could still be constructed using this alternative and, therefore, the Sizewell C Project need would be met.</p> <p>However, the option of not using the railhead would result in significantly more HGVs on the highway network. This would represent a conflict with the following objectives:</p> <ul style="list-style-type: none"> Objective 5: 'To minimise greenhouse gas emissions' (due to more HGVs on the highway network). Objective 21: 'To minimise impacts on physical and mental health' (due to significantly more HGVs travelling through local communities). Objective 22: 'To minimise the impact of nuisance on local communities, including from air quality, noise, vibration and lighting' (due to significantly more HGVs travelling through local communities). 	No

5.4 Short list of alternative options

5.4.1 The screening exercise set out in **Table 5.2** reveals that the following potential alternative solutions need to be assessed in Step 4 in **section 6** of this report, to determine if they are ‘feasible’ alternative solutions:

Phase 1

- Locate the following activities elsewhere on-site:
 - Water management zone.
 - Borrow pit stockpiling.
 - Contractors compound.
 - Haul roads.
 - Main access road.
 - Main site offices.
 - Entrance plaza.
 - Concrete batching plant.
- Cut off wall – use of a concrete pumped ring main (as opposed to batching plant).
- Main site offices – do not use piles to construct the offices.

Phase 2

- Locate the following activities elsewhere on-site:
 - Borrow pit stockpiling.
 - Entrance plaza.
 - Main site office.
 - Main works yard.
- Contractors compound – do not use hardstanding on the ground surface.

Phases 3 and 4

- Locate the stockpiles elsewhere on-site.
- Forebay – construct the forebays as semi-circular shapes rather than the proposed rectangular shapes.

6 Step 4 – Are There Any Feasible Alternative Solutions

6.1 Introduction

6.1.1 This chapter implements Step 4 of the methodology by assessing the feasibility of each short-listed potential alternative solution, as detailed above.

6.1.2 Each of the short-listed alternatives are assessed in **Table 6.1** below, in accordance with the methodology detailed in **section 2** of this report.

Table 6.1: Step 4: assessing the feasibility of short-listed options

Potential alternative solution	Legally feasible?	Technically feasible?	Financially feasible?	Take to Step 5?
Phase 1 activities: site establishment and preparation for earthworks (Years 1-2).				
Water management zone – locate elsewhere on-site.	✓	✓	✓	Yes
Borrow pit stockpiling – locate elsewhere on-site.	✓	The location of the borrow pit stockpiles is dependent on the location of the borrow pits. Borrow pits are proposed within areas where ground conditions are favourable (with regard to the material that is required for backfill). Locating the stock piles (which are proposed to be located on top of the borrow pits) elsewhere on-site is not technically practicable; it would need very significant internal site transportation arrangements and much greater handling requirements, in addition, no other alternative site is available.	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Contractors compound – locate elsewhere on-site.	✓	Land is required to accommodate the range of activities needed to build the power station and the contractors who would perform them. To maximise logistical efficiency, transport infrastructure and workforce welfare, the contractors' compound areas would be located as close to the main platform as practicable. Locating the compound elsewhere on-site is therefore possible, however, this would be highly impractical from a logistical perspective and would result in delays to the completion of the Sizewell C Project. In accordance with the method detailed in section 2.5 of this report, this option has therefore been ruled out on technical grounds (as the option would be impractical to implement).	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Haul roads – locate elsewhere on-site.	✓	✓	✓	Yes
Main access road – locate elsewhere on-site.	✓	✓	✓	Yes
Main site offices – locate elsewhere on-site.	✓	✓	✓	Yes

Potential alternative solution	Legally feasible?	Technically feasible?	Financially feasible?	Take to Step 5?
Entrance plaza – locate elsewhere on-site.	✓	✓	✓	Yes
Concrete batching plant ground preparation – locate the batching plant elsewhere on-site.	✓	✓	✓	Yes
Cut off wall – use of a concrete pumped ring main.	✓	The option of a concrete pumped ring main around the site has been considered but dismissed due to a lack of robustness. If the ring main were to block during the works, the concrete supply would be disrupted. The approach included in the DCO of using trucks to distribute the concrete from the batching plant is a more robust solution, with a continuous supply even if one truck breaks down. While technically feasible, the high risk of failure of this system means that it has been excluded from further consideration.	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Main site offices – do not use piles.	✓	Given the nature of the ground conditions on-site, it is not technically feasible to construct the main site offices without the use of piled foundations. This option has therefore been ruled out on technical grounds.	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Phase 2 activities: main development site earthworks and completion of temporary infrastructure (Years 1–4).				
Borrow pit stockpiling – locate elsewhere on-site.	✓	Borrow pits have been located within areas where ground conditions are favourable (with regard to the material that is required for backfill). Locating the stock piles (which are proposed to be located on top of the borrow pits) elsewhere on-site is not technically feasible.	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Entrance plaza – locate elsewhere on-site.	✓	✓	✓	Yes
Main site office – locate	✓	✓	✓	Yes

Potential alternative solution	Legally feasible?	Technically feasible?	Financially feasible?	Take to Step 5?
elsewhere on-site.				
Main works yard – locate elsewhere on-site.	✓	✓	✓	Yes
Contractors compound – do not use hardstanding.	✓	The movement of heavy plant and construction machinery within the site compound, without the presence of hardstanding on the ground surface would be highly impractical. Vehicle movements in and out of the compound would become extremely difficult over the course of the construction phase in the absence of hardstanding, resulting in damage to the underlying soils and delays to the construction works. This option has therefore been ruled out on technical grounds.	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Phase 3 activities: main civils (Years 3-9); Phase 4 activities: mechanical and electrical installation (Years 4-11).				
Forebays – construct as semi-circular shapes rather than the proposed rectangular shape.	✓	The forebay structures are proposed to be rectangular in shape rather than semi-circular. This is consistent with a change in design agreed for Hinkley Point C, where the rectangular shape was found to be more resilient to silt deposits. Constructing the forebays as semi-circular features would require additional maintenance during the operational phase of the Sizewell C Project, potentially increasing the risk of disruption to the operation of the power station. In accordance with the method detailed in section 2.5 of the report, this option has been ruled out on technical grounds (as the option has potential to interrupt the supply of energy in comparison to the proposed approach included in the DCO application).	As this option has been ruled out for technical reasons, its financial feasibility has not been considered.	No
Stockpiling – locate elsewhere on-site.	✓	✓	✓	Yes
Phase 5 activities: Commissioning and land restoration (Years 10-12).				
No alternative solutions have been identified that meet both the Sizewell C Project need and Sizewell C Project objectives.				

7 Step 5 – Are There Any Feasible Alternative Solutions That Have A Lesser Effect On The Integrity Of Any European Designated Site?

7.1 Introduction

7.1.1 This section implements the final step of the Stage 3 alternatives solutions assessment, whereby alternative solutions determined to be feasible are assessed in accordance with Stage 2 of the HRA process.

7.2 Step 5 assessment

7.2.1 The previous steps reveal that there are feasible alternative solutions to the Sizewell C Project proposal in the context of construction phase noise and visual disturbance arising from the main development site.

7.2.2 As detailed in **Table 6.1**, the only feasible alternative solutions identified from Step 4 relate to the relocation of certain activities elsewhere within the Order Limits during Phases 1, 2, 3 and 4. All other short-listed options are not feasible, in accordance with the methodology detailed in **section 2.5** of this report.

7.2.3 Whilst it is recognised that space within the Order Limits is at a premium (and would become more so as the construction phases progress), it has been conservatively assumed that the site could be rearranged to accommodate the feasible solutions.

7.2.4 However, these activities would still be located within the Order Limits, and would still contribute to the overall level of construction phase noise and visual disturbance to the marsh harrier population. Consequently, when all feasible alternative activities identified for Phases 1, 2, 3 and 4 that could be relocated are considered collectively, while the distribution of noise and visual disturbance effect may change, the net effect on potential for harm to the SPA and Ramsar site is highly likely to be similar to the effect of the proposed approach to construction, as assessed in the predictive noise modelling. In particular, the assumed barrier effect created due to construction noise and which is – on a conservative basis – predicted to cause marsh harrier from the Minsmere nesting area becoming displaced from parts of its foraging range at Sizewell Marshes, is not possible to avoid, regardless of layout of the construction site.

7.2.5 It is, therefore, concluded that there is no alternative solution that would result in a lesser effect on the Minsmere-Walberswick SPA and Ramsar site.

8 Conclusion

8.1.1 The assessment of alternative solutions provided in this report demonstrates that there are feasible alternative solutions to a number of the proposed activities to be undertaken during Phases 1, 2, 3 and 4 of the works associated with the main development site. No feasible alternative solutions were identified for Phase 5.

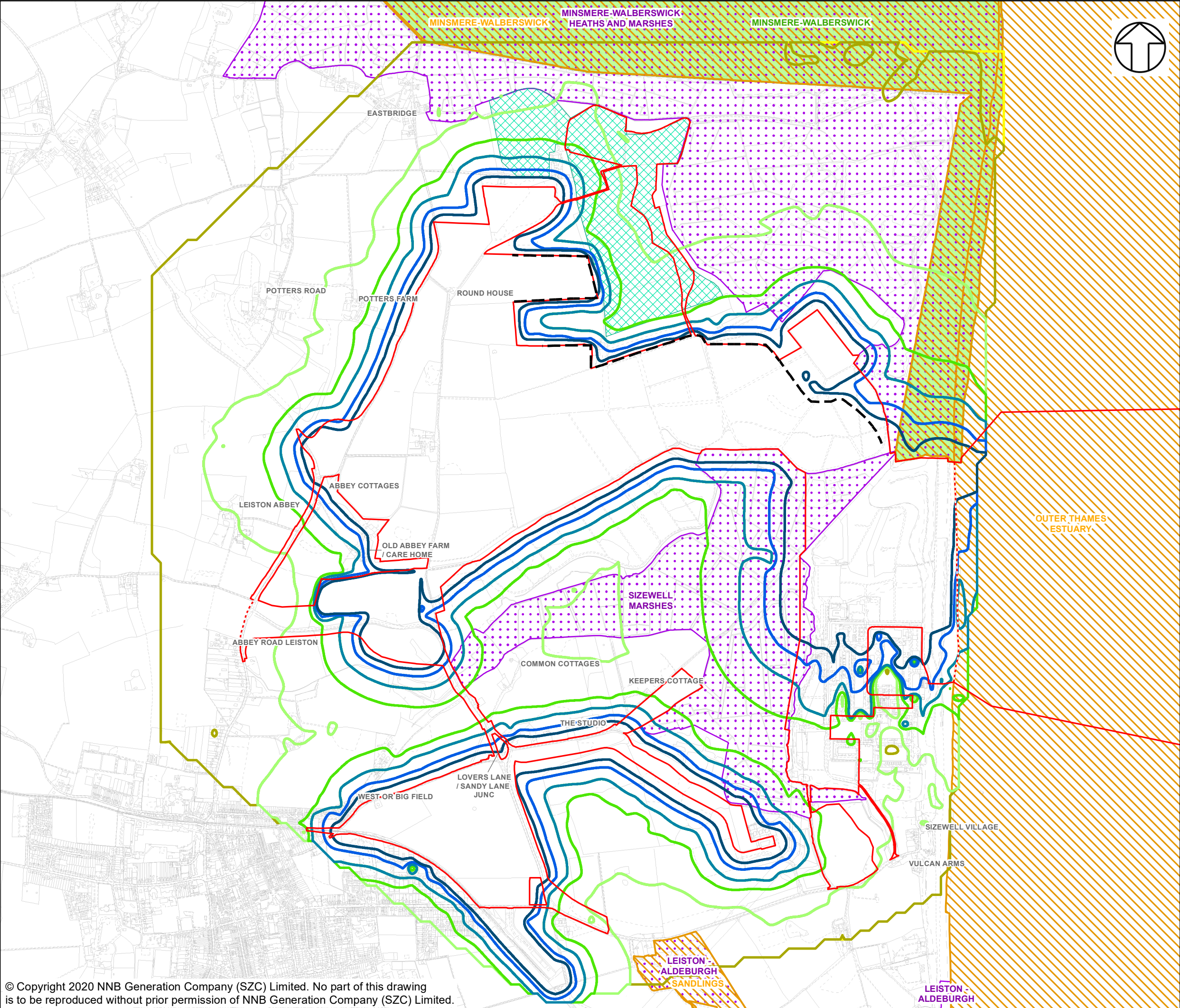
8.1.2 However, none of the feasible alternative solutions would result in a lesser effect on the Minsmere-Walberswick SPA and Ramsar site to that predicted to occur as a result of the proposed Sizewell C Project.

References

- 1.1 HM Government. 2017. The Conservation of Habitats and Species Regulations 2017.30 November 2017.
- 1.2. European Commission. 2000. Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. (“Methodological Guidance for the Habitats Directive”).
- 1.3. European Commission. 1992. Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. 21 May 1992. (“Habitats Directive”).
- 1.4. European Commission. 2007/2012. Guidance document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC. (“EC Guidance”).
- 1.5 European Commission, 2018. Managing Natura 2000 sites. The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC
- 1.6. Defra. 2012. Habitats and Wild Birds Directives: guidance on the application of article 6(4) Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures. December 2012. (“Defra Guidance”).
- 1.7. Planning Inspectorate. 2017. Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects. November 2017, Version 8. (“PINS Advice Note 10”).
- 1.8. Tyldesley, D. and Chapman C. 2013. The Habitats Regulations Assessment Handbook, October 2018 edition UK: DTA Publications Limited. (“HRA Handbook”)
- 1.9. European Court of Justice decision and associated Advocate General (AG) opinion in C-239/04: Opinion Advocate General Kokott delivered on 27 April 2006, Judgement of the Court (Second Chamber) on 26 October 2006.
- 1.10. Able Marine Energy Park DCO application and examination (including the applicant’s HRA report, Examining Authority report and SoS decision): The Able Marine Energy Park Order 201X Panel’s Findings and Recommendations to the Secretary of State – October 2013, TR030001-002225-SoS Decision letter with annexes – December 2013.
- 1.11. Department of Energy and Climate Change. 2011. Overarching National Policy Statement for Energy (EN-1). London: The Stationery Office.
- 1.12. Department of Energy and Climate Change. 2011. National Policy Statement for Nuclear Power Generation (EN-6). Volume I and Volume II. London: The Stationery Office.

- 1.13. BEIS. 2019. Updated energy and emissions projections 2018, Appendix F: Final energy demand. <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2018>, accessed 29 November 2019.
- 1.14. National Audit Office. 2016. Nuclear power in the UK. NAO. July 2016.
- 1.15. Energy Research Partnership. 2015. Managing flexibility whilst decarbonising the GB electricity system. August 2015, p. 14.
- 1.16. DECC. 2008. The Climate Change Act 2008. 16 October 2008.
- 1.17. BERR. 2008. Meeting the Energy Challenge – A White Paper on Nuclear Power. January 2008.
- 1.18. BEIS. 2017. The Clean Growth Strategy: Leading the way to a low carbon future. October 2017.
- 1.19. BEIS 2018. Government response: Consultation on the siting criteria and process for a new National Policy Statement for nuclear power with single reactor capacity over 1 gigawatt beyond 2025.
- 1.20. DECC. 2011. National Policy Statement for Nuclear Power Generation (EN-6). Volume I and Volume II. London: The Stationery Office.
- 1.21. SZC Co. 2016. Sizewell C Proposed Nuclear Development. Stage 2 Pre-Application Consultation. Consultation Document.
- 1.22. Department of Energy and Climate Change. 2010. Appraisal of Sustainability: Site Report for Sizewell.
- 1.23. Suffolk Coastal District Council (SCDC). 2013. Suffolk Coastal District Local Plan. Core Strategy and Development Management Policies Development Plan Document.
- 1.24. Department of Energy & Climate Change. 2010. Appraisal of Sustainability of the revised draft Nuclear National Policy Statement: Main Report
- 1.25. British Standard BS5228-1 Noise: 2009/2014 – Code of Practice for noise and vibration control at open construction sites – Noise
- 1.26. British Standard BS5228-2 Vibration: 2009/2014 – Code of Practice for noise and vibration control at open construction sites – Vibration
- 1.27. Department for Business, Energy and Industrial Strategy. 2017. Statement on Energy Infrastructure: Written statement – HLWS316. Available at: <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Lords/2017-12-07/HLWS316/>. Accessed December 2019

APPENDIX A: Key noise contour plots



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA
- FENCE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 1 - 5M BARRIER

NOISE LEVEL L_{max} (DB)

- <= 54
- 54 - 64
- 64 - 70
- 70 - 74
- 74 - 79
- 79 - 84
- >84

NOT PROTECTIVELY MARKED

COPYRIGHT
Reproduced from Ordnance Survey map with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationery Office © Crown Copyright (2019). All Rights reserved. NNB GenCo 0100060408.
© Natural England material is reproduced with the permission of Natural England 2019.
Contains data © Environment Agency Copyright and/or database right 2017. All rights reserved.



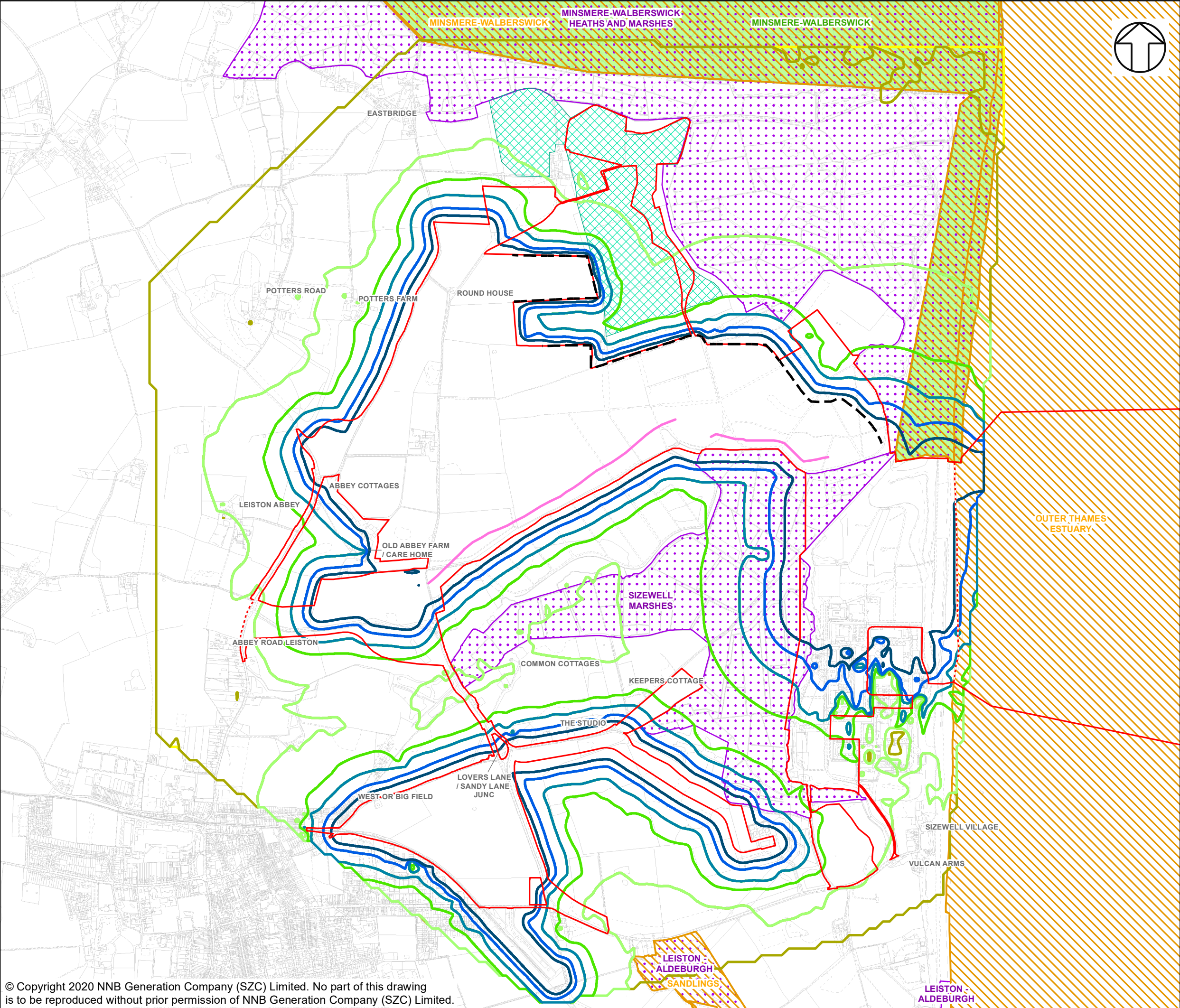
DOCUMENT:
SIZEWELL C
SHADOW HRA REPORT
CHAPTER 8
INFORMATION FOR AA:
BIRDS

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION
FOR PHASE 1 CONSTRUCTION FOR SIZEWELL C
WITH 5M HIGH FENCE IN PLACE (BORROW PIT
OPTION 2 - AREAS 1 AND 2)

DRAWING NO:
FIGURE 8.3

DATE: JAN 2020 **DRAWN:** F.C. **SCALE:** 1:16,000 @A3

SCALE BAR
0 100 200 300 400 500
M



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA
- BUND
- FENCE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 2

NOISE LEVEL $L_{Amax}(DB)$

- ≤ 54
- 54 - 64
- 64 - 70
- 70 - 74
- 74 - 79
- 79 - 84
- >84

NOT PROTECTIVELY MARKED

COPYRIGHT

Reproduced from Ordnance Survey map with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationery Office © Crown Copyright (2019). All Rights reserved. NNB GenCo 0100060408.
© Natural England material is reproduced with the permission of Natural England 2019.
Contains data © Environment Agency Copyright and/or database right 2017. All rights reserved.



DOCUMENT:
SIZEWELL C
SHADOW HRA REPORT
CHAPTER 8
INFORMATION FOR AA:
BIRDS

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION FOR
PHASE 2 CONSTRUCTION FOR SIZEWELL C
(BORROW PIT OPTION 2 - AREAS 1 AND 2)

DRAWING NO:
FIGURE 8.4

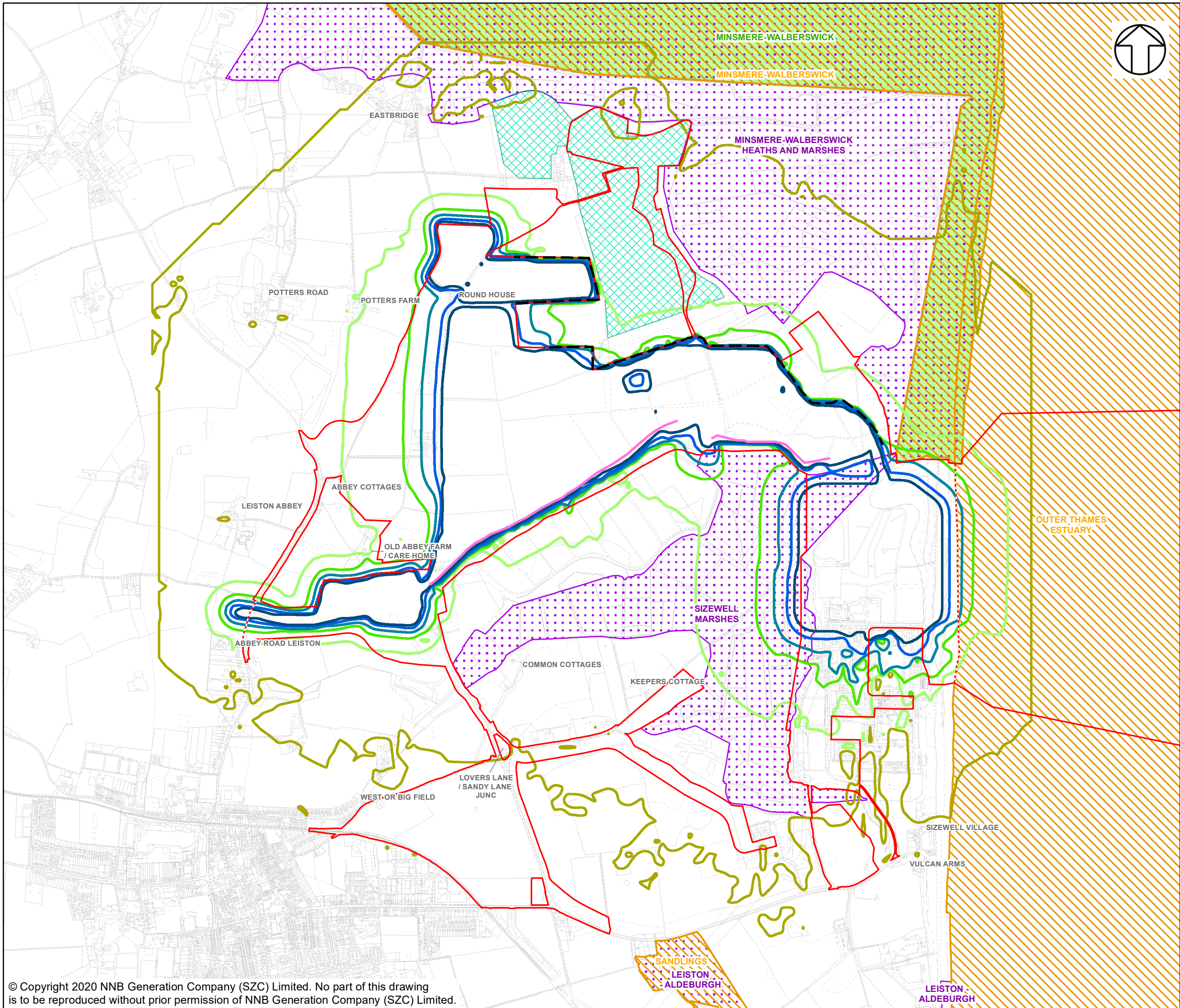
DATE:
JAN 2020

DRAWN:
F.C.

SCALE:
1:16,000 @A3

SCALE BAR

0 100 200 300 400 500
M



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA
- BUND
- FENCE
- DESIGNATIONS
 - SPECIAL PROTECTION AREA (SPA)
 - SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
 - RAMSAR SITE
- PHASES 3 AND 4
- NOISE LEVEL $L_{Amax}(DB)$
 - 54 - 64
 - 64 - 70
 - 70 - 74
 - 74 - 79
 - 79 - 84
 - >84

NOT PROTECTIVELY MARKED

COPYRIGHT
Reproduced from Ordnance Survey map with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationary Office © Crown Copyright (2019). All Rights reserved. NNB GenCo 0100060408.
© Natural England material is reproduced with the permission of Natural England 2019.
Contains data © Environment Agency Copyright and/or database right 2017. All rights reserved.

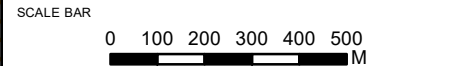


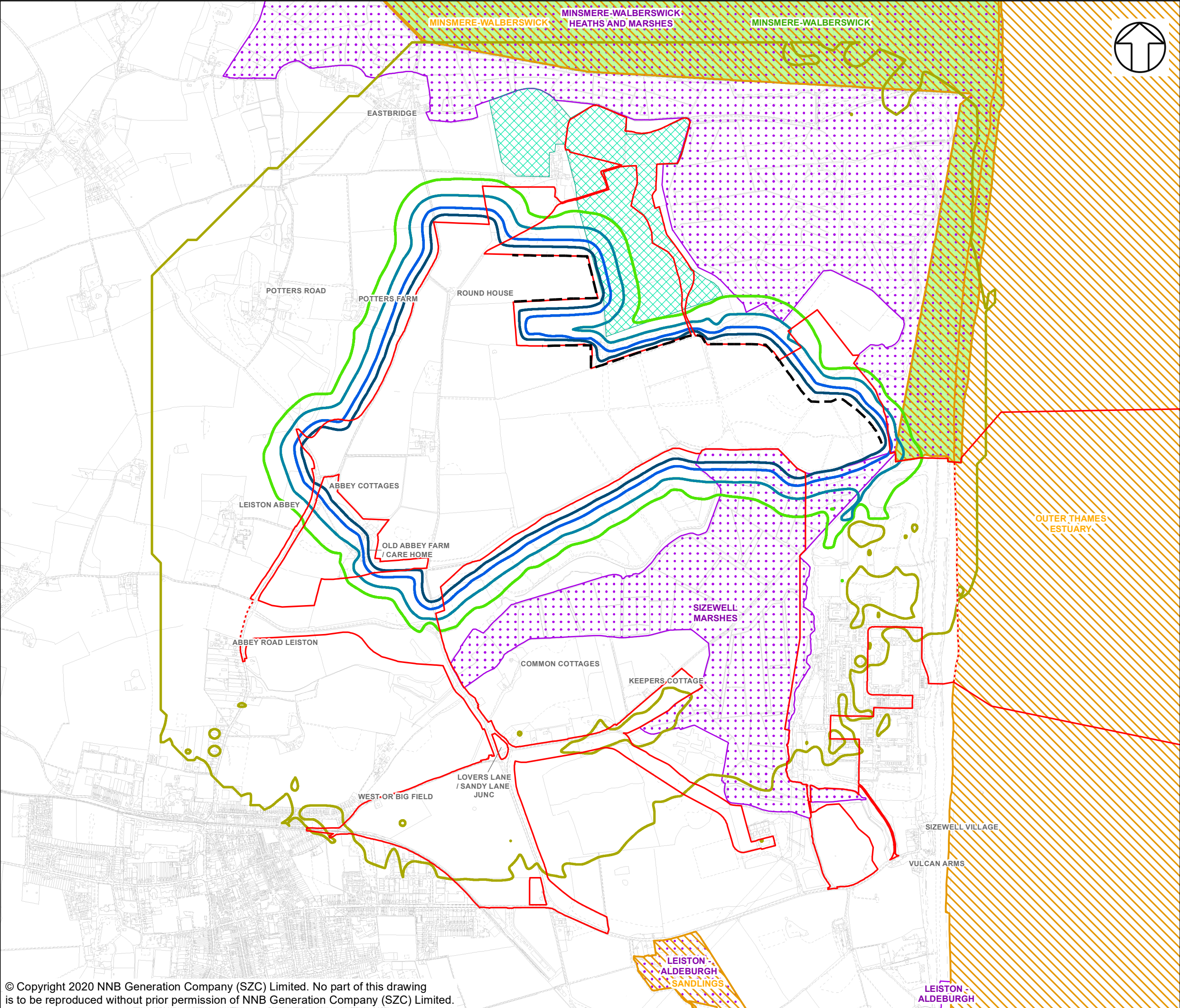
DOCUMENT:
SIZEWELL C
SHADOW HRA REPORT
CHAPTER 8
INFORMATION FOR AA: BIRDS

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION
FOR PHASES 3 AND 4 CONSTRUCTION FOR
SIZEWELL C

DRAWING NO:
FIGURE 8.5

DATE: JAN 2020 **DRAWN:** F.C. **SCALE:** 1:16,000 @A3





NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- HARRIER HABITAT IMPROVEMENT AREA
- FENCE

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 5

NOISE LEVEL $L_{max}(DB)$

- 54 - 64
- 70 - 74
- 74 - 79
- 79 - 84
- >84

NOT PROTECTIVELY MARKED

COPYRIGHT
Reproduced from Ordnance Survey map with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationary Office © Crown Copyright (2019). All Rights reserved. NNB GenCo 0100060408.
© Natural England material is reproduced with the permission of Natural England 2019.
Contains data © Environment Agency Copyright and/or database right 2017. All rights reserved.



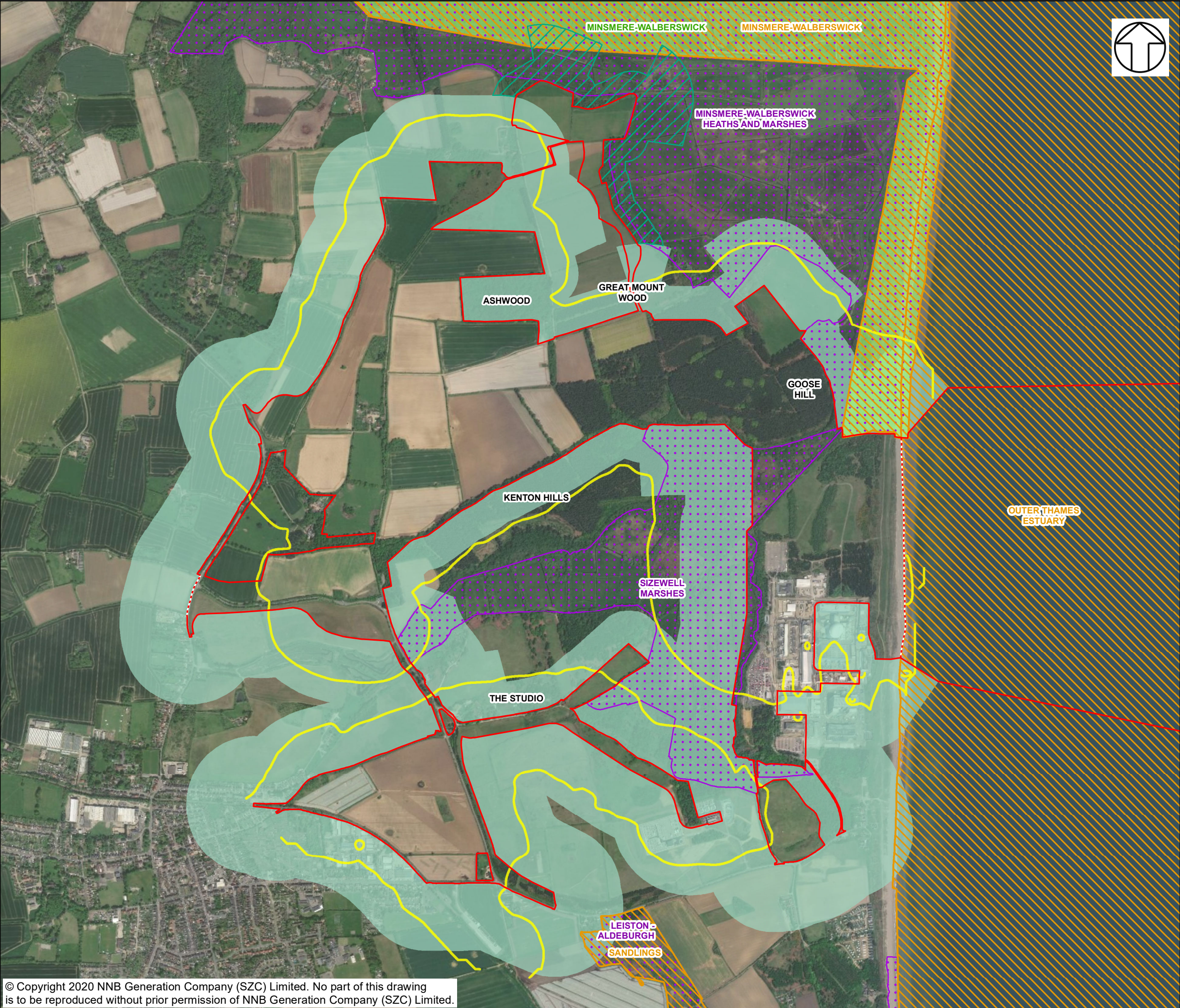
DOCUMENT:
SIZEWELL C
SHADOW HRA REPORT
CHAPTER 8
INFORMATION FOR AA: BIRDS

DRAWING TITLE:
PREDICTED PEAK NOISE AT 3M ELEVATION
FOR PHASE 5 CONSTRUCTION FOR
SIZEWELL C

DRAWING NO:
FIGURE 8.6

DATE: JAN 2020 **DRAWN:** F.C. **SCALE:** 1:16,000 @A3

SCALE BAR
0 100 200 300 400 500 M



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- VISUAL DISTURBANCE BUFFER
- VISUAL DISTURBANCE BUFFER FOR CONSTRUCTION OF THE WATER STORAGE AREA (RELEVANT TO THE FIRST WINTER OF THE CONSTRUCTION PERIOD ONLY)

DESIGNATIONS

- SPECIAL PROTECTION AREA (SPA)
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- RAMSAR SITE

PHASE 1 - (INCLUDING 5M FENCE)

NOISE LEVEL L_{Amax} (DB)

70

NOT PROTECTIVELY MARKED

COPYRIGHT
Reproduced from Ordnance Survey map with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationery Office © Crown Copyright (2019). All Rights reserved. NNB GenCo 0100060408.
Basemapping: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
© Natural England material is reproduced with the permission of Natural England 2019.



DOCUMENT:
SIZEWELL C
SHADOW HRA REPORT
CHAPTER 8
INFORMATION FOR AA:
BIRDS

DRAWING TITLE:
THE 70DB L_{Amax} NOISE CONTOUR FOR THE WORST-CASE PREDICTION FOR PHASE 1 OF CONSTRUCTION, TOGETHER WITH THE VISUAL IMPACT ZONE

DRAWING NO:
FIGURE 8.12

DATE: JAN 2020 **DRAWN:** F.C. **SCALE:** 1:16,000 @A3

SCALE BAR
0 100 200 300 400 500 M