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WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Generating Station

Environmental Impact Assessment Scoping Report

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1 Introduction

1.1 Background

Horizon Nuclear Power Limited (Horizon) is a UK Energy company developing a new generation of nuclear power stations to help meet the UK's need for stable and sustainable low carbon energy. Building on the core values of safety, courage, integrity, collaboration and inspiration, Horizon Nuclear Power Limited's vision is as follows:

"*We believe there is a compelling requirement for new nuclear power in the UK to help tackle the vital and complex challenge of delivering a sustainable energy future. Horizon will deliver secure, affordable, low carbon energy for present and future generations*."

Horizon is proposing to submit an application for a Development Consent Order (DCO) to the Planning Inspectorate to construct a new nuclear power station (the Wylfa Newydd Project or the Project) at Wylfa Peninsula.

The Government issued the National Policy Statement (NPS) for Nuclear Power Generation EN-6 (NPS EN-6) in 2011. NPS EN-6 identifies a small number of sites in the UK as being potentially suitable for the deployment of a new nuclear power station, including one on Anglesey. Horizon refers to this site as the Wylfa NPS Site. It comprises 254 hectares of land to the south of the existing Magnox power station (Existing Power Station).

The Wylfa Newydd Generating Station (the Generating Station) would include two UK Advanced Boiling Water Reactors (UK ABWRs), with a combined electrical output of approximately 2700 megawatts (MW), which is enough power for approximately five million average homes.

This report sets out the proposed scope for an Environmental Impact Assessment (EIA) for the Wylfa Newydd Generating Station and the resulting Environmental Statement to be submitted with the application for a DCO. Horizon currently anticipates submitting an application for a DCO in February 2017.

1.2 Location

Four areas are used when describing the Project:

- Power Station Site – the indicative areas of land and sea within which the majority of the permanent Power Station buildings, plant and structures would be situated. It would include the two nuclear reactors, steam turbines, the cooling water system (CWS) intake and pumphouse, outfall structures, breakwaters and the marine off-loading facility (MOLF), as well as other ancillary structures;
- Wylfa NPS Site –NPS EN-6 identifies a small number of sites in the UK as being potentially suitable for the deployment of a new nuclear power station. NPS EN-6 identifies one such site on Anglesey. Horizon refers to this site as the Wylfa NPS Site;
- Wylfa Newydd Development Area – the indicative areas of land and sea including the Power Station Site, Wylfa NPS Site and the surrounding areas that would be used for the construction and operation of the Power Station. This area is representative of the

maximum area that would be physically affected by Power Station main construction activities and used to form the setting and features of the operational Power Station; and

- Off-Site – the areas of land needed for the Project that fall outside the Wylfa Newydd Development Area. Components that would be off-site include most of the Associated Development needed for both construction and operation of the Power Station for which planning applications would be made, as well as the Off-Site Power Station Facilities that would be included within the application for a DCO for the Wylfa Newydd Generating Station.

The Wylfa Newydd Development Area is located on the north coast of Anglesey, covers approximately 380 hectares of land and extends into the Irish Sea at Porth-y-pistyll. It is bounded to the north by the Existing Power Station. To the east, it is separated from Cemaes by a narrow corridor of agricultural land. The A5025 road and residential properties define part of the south-east boundary, with a small parcel of land spanning the road to the north-east of Tregele. To the south and west, the Wylfa Newydd Development Area abuts agricultural land. To the west it adjoins the coastal hinterland and includes part of Cestyll Garden, beyond which lies Cemlyn Bay. Cestyll Gardens is recorded as Grade II on the Cadw/ International Council of Monuments and Sites UK (ICOMOS) Register of Historic Parks and Gardens in Wales.

Land extending to the north-east of Cemaes and to the west of Cestyll Garden is designated as an Area of Outstanding Natural Beauty (AONB) and both areas abut coastline that is designated as part of the North Anglesey Heritage Coast. A small section of the Wylfa Newydd Development Area to the south-west of the Existing Power Station is within the AONB. The Wylfa Newydd Development Area also lies within the locally designated Anglesey Special Landscape Area. Away from the coast, the land generally comprises rough grazing with exposed rock and gorse thickets. Farther inland the land is low lying and gently undulating with scattered farms, small settlements and isolated woodland.

The Existing Power Station occupies the land to the north-east and east of the Wylfa NPS Site. The Existing Power Station is owned by the Nuclear Decommissioning Authority and operated by Magnox (owned by Cavendish Fluor Partnership), who is the Nuclear Licensee. The Existing Power Station began commercial operation in 1971. Its two Magnox reactors and associated turbo-generators had a generating capacity of up to 980 megawatts (electrical) [MW(e)] , supplying approximately 40% of Wales' electricity demand. The Existing Power Station ceased generation on 31st December 2015 and will be followed by a campaign of intensive defueling lasting around 3 years.

Settlement patterns around the Wylfa Newydd Development Area are characterised by small clusters of residential dwellings and isolated farmsteads. Larger settlements include the villages of Cemaes to the east and Tregele to the south-east. Other urban areas include the towns of Amlwch (9km east), Holyhead (24km south-west) and Llangefni (37km south-east).

The Project includes a number of vital components that must be developed away from the Power Station Site and hence will be included in the DCO application. These components are referred to as Off-Site Power Station facilities and are an integral part of the Generating Station and of Horizon's emergency arrangements.

Horizon is considering a number of potential locations for these Off-site facilities, however the preferred options have been identified and discussed further in this report.

The current locations under consideration for the Off-Site Power Station facilities are:

- Cefn Coch – the preferred location for the Alternative Emergency Control Centre (AECC) and Environmnetal Survey laboratory (ESL);
- Land adjacent to the A5025 in Llanfaethlu – The preferred location for the Mobile Emergency Equipment Garage (MEEG).

The Cefn Coch site is in a rural location with a number of scattered farmsteads and houses located within 500m of the Cefn Coch site. Residential areas of Cefn Coch and Llanrhyddlad are located 0.5km north-east and 1.4km south-west, respectively.

The Cefn Coch site is located in a landscape that is mainly agricultural of relatively flat topography and is bordered by a hedgerow along the north-east border, the A5025 to the east, Cylch-y-Garn Road to the north, the Afon Cafnan watercourse which runs along the western boundary and a separate water channel running along the southern boundary. Several other watercourses surround the Cefn Coch site.

The Llyn Llygeirian SSSI, a site designated for its biological interest as an example of a moderately base-rich lake in West Gwynedd, is located 300m south-east of the Cefn Coch site.

The preferred site for the MEEG is on land adjacent to A5025 in Llanfaethlu located approximately 350m to the north-east of the centre of the village of Llanfaethlu with direct access onto the A5025. The Llanfaethlu site extends to approximately 1ha and is situated on the east side of the A5025.

The surrounding area is relatively flat in topography and predominantly rural in nature, comprising agricultural land with hedgerows forming the southern and eastern boundaries of the Llanfaethlu site. Residential properties lie adjacent to the northern and southern extent of the Llanfaethlu site and an access track to residential properties forms the northern boundary.

The Llanfaethlu site is occupied by a vehicle repair garage which until recently included facilities for commercial heavy goods vehicle repairs. A sewage works is located approximately 70m south-east of the site whilst a historic landfill has been recorded opposite. The Llanfaethlu site is surrounded by a number of other watercourses and ponds, the closest of which is a small watercourse approximately 80m south of the site boundary and which is a tributary of the Afon Llanrhyddlad.

The land on the opposite side of the A5025 from the Llanfaethlu site is within the AONB.

The nearest designated nature conservation site is the Llyn Garreg-lwyd SSSI, a site designated as an example of tall fen dominated by common reed Phragmites australis, approximately 700m north-west of the Llanfaethlu site.

1.3 Project Overview

The Wylfa Newydd Project as a whole includes:

- the Wylfa Newydd Generating Station - the proposed new nuclear power station including two UK ABWRs to be supplied by Hitachi-GE Nuclear Energy Ltd., together

with associated plant and ancillary structures and features to be constructed and operated on Anglesey; and

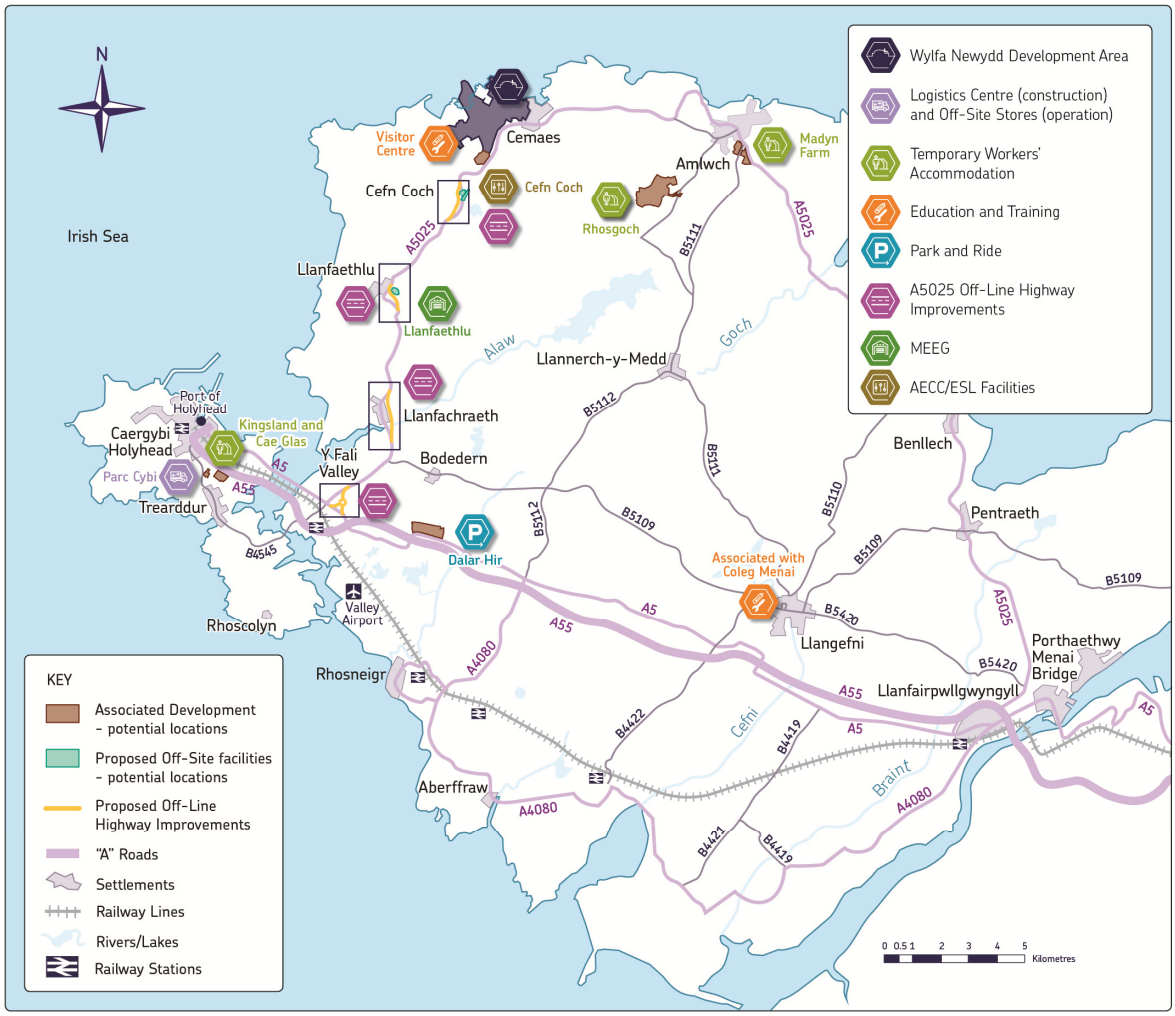
- Associated Development - development to support the delivery of the Generating Station, for example highway improvements along the A5025, Park and Ride facilities for construction workers, Off-Site Stores, Logistics Centre, Temporary Workers' Accommodation, replacement Magnox Alternative Emergency Control Centre, Environmental Survey Laboratory, and Horizon's Visitor Centre. Horizon proposes to consent these facilities through applications for planning permission under the Town and Country Planning Act 1990, they are not therefore included within this scoping report. See figure 1.1 for indicative locations of these associated developments. These facilities would, however, be considered as part of the cumulative impact assessment contained in the Environmental Statement supporting the DCO application. The draft Wales Bill (October 2015) introduces the possibility that associated development could be incorporated in development consent order applications in Wales for the first time. We will monitor the progress of the Bill and discuss its implications with the Planning Inspectorate, the Isle of Anglesey County Council and the Welsh Government. Any future decision on a change to the consenting route for these developments would be made in a transparent manner and widely communicated through our consultation documents. Further EIA scoping may therefore be required at a later date although given that the majority of associated development will have been separately scoped this may not be necessary.

The Wylfa Newydd Project requires the development of complex infrastructure that will ultimately enable electricity generated at the Power Station to be exported to the national grid electricity transmission network. Additionally, the surrounding land and marine areas would have an important role during construction and operation of the Generating Station, supporting essential construction facilities, temporary and permanent infrastructure and enabling the creation of an appropriate landscape setting for the Power Station.

The creation of the Generating Station would build on the long-established history of nuclear power generation on Anglesey, creating significant employment opportunities and injecting many million pounds per year into the economies of Anglesey and north Wales. Horizon is committed to working with existing training and service providers, including Coleg Menai and Bangor University, to maximise the opportunities available to residents across north Wales both in preparation and for the lifetime of the Wylfa Newydd Generating Station. In the long term, the Wylfa Newydd Project would also contribute to the Isle of Anglesey County Council's (IACC's) aspiration to create 'a world-renowned centre of excellence for the production, demonstration and servicing of low carbon energy.'

The Wylfa Newydd Project is expected to create up to 850 permanent jobs on Anglesey and up to 1,000 additional temporary jobs during periodic outages for maintenance, presenting opportunities to draw on the experienced regional skills base in nuclear power generation and servicing. Several thousand construction workers would be required with numbers estimated to reach between 8,000 and 10,000 shift workers during peak periods. There would also be considerable additional opportunities generated for supporting businesses such as catering, facilities management and logistics and Horizon is already actively engaged with potential supply chain businesses as a result of the registration system and special events.

Figure 1.1 Indicative distribution of Wylfa Newydd Project components (including DCO and TCPA components)



1.4 Environmental Scoping

This Scoping Report accompanies a written request to the Secretary of State (submitted to the Planning Inspectorate (PINS)) for a Scoping Opinion in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263).

Scoping is an early stage in the EIA, and is key to an efficient process and a good quality Environmental Statement. It is not a statutory requirement in the UK but the Government encourages developers to consult the PINS and key consultees on the scope of information that should be included in an Environmental Statement to accompany a DCO.

The Regulations set out the basic information that a developer should supply with a scoping request. In practice, most developers undertake a 'shadow' scoping to assist the determining authority. Information required in a scoping opinion request comprises:

a. a plan sufficient to identify the land;

b. a brief description of the nature and purpose of the development and of its possible effects on the environment; and
c. such other information or representations as the person making the request may wish to provide or make.

The aims and objectives of this Scoping Report are:

- To provide a brief description of the project;
- To identify key environmental constraints and sensitivities;
- To identify the likely key impacts, both positive and negative, and to identify associated preliminary opportunities for mitigation and enhancement;
- To provide an outline of the methodologies of the assessments to be carried out;
- To identify gaps in information and proposed further surveys;
- To outline the strategic background, for example proposed and existing legislation/planning guidance and required consents; and
- To identify the way forward for further stages of the EIA and the consultation process.

1.4.1 Updates to the 2009 Scoping Report

This EIA Scoping Report builds on an original Scoping Report submitted to the Infrastructure Planning Commission (IPC)[1] in November 2009. The main purpose of requesting a further opinion is to ensure that the following changes to the Wylfa Newydd Project and the legislative and policy framework have been included in the scoping process:

- Change of ownership of Horizon from RWE AG and E.ON AG to Hitachi Ltd.
- Change in reactor technology from Pressurised Water Reactor to ABWR
- Publication of NPS EN-1 (the overarching NPS for Energy) and NPS EN-6 (for Nuclear Power Generation)
- Publication of the Anglesey and Gwynedd draft Joint Local Development Plan (JLDP) and the New Nuclear Build at Wylfa: Supplementary Planning Guidance (SPG), IACC
- Changes to legislation governing the determination of applications for Nationally Significant Infrastructure Projects (NSIPs), the abolition of IPC and transfer of responsibilities to the relevant Secretary of State with the assistance of the PINS
- A new EIA Directive (2011/92/EU) was introduced in 2011, with changes brought into force on 14 May 2014 (EIA Directive 2014/52/EU).
- New stakeholders identified for consultation.

Horizon is aware that most of these changes i.e. changes in reactor technology and ownership are not likely to affect the scope of the Wylfa Newydd EIA and therefore this Scoping Report focuses only on the aspects that are likely to affect the EIA.

This Scoping Report sets out the latest proposals, including information about how they have evolved since Horizon's scoping report submitted in 2009. The key differences in the original scoping report and this scoping report have been summarised in Table 1.1. This has been

[1] Infrastructure Planning Commission was the predecessor to the Planning Inspectorate as the decision making body for NSIPs, prior to changes brought about by the Localism Act 2011.

further informed by work and responses associated with Horizon's first stage of formal pre-application consultation (Stage One pre-application consultation (PAC1)), which was started in in December 2014. The aim of PAC1 was to provide clear information to allow the development of an open and on-going dialogue with Horizon's key stakeholders and the community, addressing the requirements of section 47 of the Planning Act 2008. Further information on Horizon's approach to consultation is detailed in chapter 5.

A Preliminary Environmental Information (PEI) Report was prepared for PAC1 which set out the environmental information available in relation to the Wylfa Newydd Project proposals. The Stage One PEI Report primarily described the existing baseline environmental conditions and a preliminary indication of likely impacts that could arise from the Wylfa Newydd Project. The PEI report can be accessed on the Horizon website at http://consultation.horizonnuclearpower.com/document-library/consultation-documents.

The Wylfa Newydd Project will continue to evolve with new information being made available up to the submission of the Environmental Statement accompanying the DCO application.

Table 1.1 Summary of key updates to the Scoping report

Topics	Scoping Report 2009	Updated Scoping Report, 2016
Reference to Site	Site name was Wylfa Peninsula. No sub-areas are mentioned.	Four areas are used when describing the Project and have been described in Section 1.2 • the Power Station Site; • Wylfa NPS site; • Wylfa Newdd Development Area; & • Offsite areas.
Project Description	The Project outline in the original scoping report included the following sections: • Power station • Construction stage areas and facilities, MOLF • Infrastructure and ancillary facilities, • Transmission infrastructure, • Interim waste storage facilities • Access roads • Landscape and biodiversity initiatives and mitigation measures The scoping report (Section 2.4) states that the ES for the project would include a description of the likely transmission infrastructure and its main environmental impacts.	The transmission infrastructure i.e. connection from the substation into the National Grid is a separate project and is the responsibility of National Grid Electricity Transmission plc. (Section 2.4) and is not considered as a part of the Wylfa Newydd Project. The Project components are now split between the (see Section 1.3): • Wylfa Newydd Generating Station; and • Associated Development. The Project description (Chapter 3) now describes the components of the Power Station (Section 3.2) in three categories • Main plant • Common plant and • Supporting Facilities, Buildings, Structures and Features The chapter overall presents more specific information about each project component, especially the more

Topics	Scoping Report 2009	Updated Scoping Report, 2016
		strategic facilities such as the MOLF, radioactive waste buildings and cooling water systems. The chapter also outlines their role in the overall project. Details of the Off-Site Power Station Facilities have now been included in the application for the DCO and would be located Off-Site to complement the facilities that would be within the Power Station Site is provided in Section 3.8.
Construction	Construction of the site is described in three phases • Site preparation and preliminary works • Construction • Commissioning	The Project is divided into four main stages as outlined in Section 3.7 of Scoping Report, 2016 • Stage One: Enabling Works • Stage Two : Main Construction • Stage Three: Commissioning and Operation • Stage Four: Decommissioning
Legislation and Regulatory context	Strategic context (1.6) Regulatory Context (1.7) Planning Policy Context (1.8) are all separate sections	These sections have been updated and are now amalgamated into an independent chapter titled: • Regulatory and Policy background (Chapter 2) The chapter sets out the: • Strategic Context**,** including need for development and the planning policy context; • Nuclear regulatory Context**,** including the generic and site specific processes; • Other legislative requirements, including environmental permitting, marine licensing, protected species licensing; and

Topics	Scoping Report 2009	Updated Scoping Report, 2016
		• Connection to the national electricity grid
Design Evolution	Brief summary of alternatives is provided.	Further details on alternatives and design evolution have been provided in Chapter 4.
Consultation	Brief description of consultation provided.	New chapter on consultation (chapter 5) has been included. The chapter summarises the pre-application consultation carried out by Horizon till date under the Planning Act 2008. Details of the stakeholder engagement carried out with key statutory bodies as well as with the local community have also been included in the chapter.
Scoping	Information on topics scoped out not provided.	Chapter 6 provides a detailed context for the scoping process carried out as part of the EIA process. This Scoping Report, 2016 provides the reasoning behind the scoping out of certain topics from the EIA in Section 6.3. The topics proposed to be scoped out are: • Odour • Insect infestation • Accidental radiological releases • Seismic risk • Civil and military aviation and defence interests
Health, Safety and Security	Health, Safety and Security was covered in a separate chapter	No separate chapter on Health, Safety and Security and is now covered to an extent under the following chapters: • Air Quality (Chapter 8); • Noise and Vibration (Chapter 9);

Topics	Scoping Report 2009	Updated Scoping Report, 2016
		• Socio-economics (Chapter 18) A separate Health Impact Assessment (HIA) will be carried out and the HIA Report will accompany the DCO application alongside the Environmental assessment. Safety and Security are not environmental issues and hence not addressed in this Scoping Report (Table 6.1).
Approach to Environmental Impact Assessment	Brief outline of the proposed approach to the environmental impact assessment of the project.	Chapter 7 provides a detailed context on the proposed approach to undertaking the EIA that will inform the Environmental Statement to be submitted as part of the Wylfa Newydd DCO application including details of the methodology, screening, scoping, assessment, baseline studies, impact evaluation, significance criteria, design iteration & mitigation proposals and residual effects. It also describes a number of parallel impact assessments being undertaken, such as Welsh Language Impact Assessment (WLIA), Habitats Regulations Assessment (HRA) and Health Impact Assessment (HIA) (Section 7.3). The chapter provides an update on how the Environmental Impact Assessment (EIA) is progressing at this stage. Additional topics included in Chapter 7 include: • Transboundary effects, its regulatory context and relevance to the project (Section 7.2.6) • A modular EIA approach (Section 7.2.7)
Cumulative Effects	Only a brief mention of Cumulative Effects is	Cumulative Impact Assessment is now covered under an independent chapter (chapter 21), which includes the

Topics	Scoping Report 2009	Updated Scoping Report, 2016
	provided.	approach to the assessment; defines the spatial limits of the project and identifies the initial long list of reasonable foreseeable future projects and the proposed short-list of future projects for inclusion in the assessment as there is a potential for cumulative effects to occur.
EIA Topics	The EIA Topics include • Geology, hydrogeology and hydrology • Flood risk • The marine environment • Landscape and visual effects • Terrestrial ecology • Archaeology and cultural heritage • Traffic and transport • Noise and vibration • Air quality and dust • Public access and recreation • Socio-economic effects	The Scoping Report, 2016 (and the Wylfa Newydd EIA) includes the following additional topic: • Coastal processes and geomorphology (Chapter 15) Geology, hydrogeology and hydrology have also been split into the following two independent chapters: • Soils and Geology (Chapter 13) • Surface Water and Groundwater which includes flood risk (Chapter 14) There have been changes to the scope of assessment for some topics as listed below: • The scope of the Terrestrial Ecology chapter now includes Freshwater Ecology (Chapter 11). • The scope of Marine Environment assessment (Chapter 16) now includes non-native species. • Archaeology and Cultural Heritage assessment (Chapter 17) now includes effects on marine archaeological remains. • The Socio-Economics (Chapter 18) now considers impacts on skills and issues of social cohesion.

Topics	Scoping Report 2009	Updated Scoping Report, 2016
EIA Topics	The scoping report pre-dates the NPS EN-1 and NPS EN-6.	NPS EN-1 and NPS EN-6 set out the environmental assessment requirements for each specific topic. Each topic refers to the NPS EN-1 and NPS EN-6 and identifies how the environmental statement will comply with the requirements.
	The scoping report doesn't identify a distinct study area for each environmental topic.	A study area has been established and described for each topic and reflects the area over which relevant effects may potentially be felt. The spatial extent of and reasons for the study area for each topic is outlined in Chapters 8-21. For some aspects, this may be limited to the immediate area of development itself while for some other topics, the potential effects of development related activities may extend well beyond the actual development site, so the study area will be significantly larger.

Topics	Scoping Report 2009	Updated Scoping Report, 2016
	Each EIA chapter contains these sub headings: • Introduction • Existing environment • Potential environmental effects and mitigation	In addition to the information contained in the original scoping report each EIA chapter in the Scoping Report, 2016 (Chapters 8-21) now includes: • Sensitive receptors / key designations listed; • Study area for each topic and the required justification; • Existing environment, described in more detail; • Scope, methodology and criteria for environmental assessment; • Summary of the baseline surveys and studies carried out such as noise monitoring etc., undertaken since the publication of the scoping report in 2009; • Impacts during decommissioning (where relevant), although it is recognised that decommissioning activities would constitute a separate EIA and at this stage assessment of the decommissioning phase will be more qualitative by nature; • Further description of the potential mitigation measures to be provided • Outline of specific strategies such as the Integrated Traffic and Transport Strategy.

1.4.2 Structure of the Report

This scoping report is structured as follows:

- **Chapter 1: Introduction** provides background information about the Wylfa Newydd proposals, the aims of the Scoping Report and provides an outline of the legislative and planning context;
- **Chapter 2: Regulatory and Policy background** outlines the policy and regulatory context for the Wylfa Newydd Project;
- **Chapter 3: Wylfa Newydd Project Description** provides an overview of the Project describing its main features and principal components;
- **Chapter 4: Consideration of Alternatives;**
- **Chapter 5: Consultation** outlines the approach to consultation and summarises the consultation carried out till date;
- **Chapter 6: Scoping** provides background and the proposed approach to the scoping process
- **Chapter 7: Approach to the Environmental Impact Assessment** provides a description of the proposed approach to the EIA process and includes details of the proposed form of the Environmental Statement and the approach to the assessment process;
- **Chapters 8-20: EIA topics** –the proposed scope of the EIA is set out for each of the topics identified for consideration. In general, for each topic, the existing information is summarised, potential effects and mitigation measures are set out, and the further studies and assessments required for the topic are indicated; and
- **Chapter 21: Cumulative Effects** presents the approach to undertaking and reporting the cumulative effects assessment.

2 Regulatory and Policy Background

This chapter outlines the key regulatory considerations for the development of new nuclear power stations in the UK.

A number of planning and development consents are required for the construction, operation and maintenance of the Wylfa Newydd Project. This chapter provides an overview of the regulatory and policy framework that is relevant to the Project, focusing on the current and emerging policies at the UK, national and local levels as they relate to the likely scope of the EIA.

A more detailed description of the planning policy background will be provided in the Planning Statement that will support the DCO application documentation.

2.1 Strategic Context

2.1.1 The Need for Development

2.1.1.1 National Policy Statements

For the purposes of implementing the Planning Act 2008, the Secretary of State has set out relevant UK planning policy in a series of NPSs. These NPSs provide an important policy context, because the Secretary of State must decide an application for a DCO in accordance with any relevant NPS.

The principal policy framework for the Wylfa Newydd Project comprises the 'Overarching Energy NPS' (EN-1) and the 'Nuclear Power Generation NPS' (EN-6). These form the primary policy context for a decision on Horizon's application for a DCO for the Power Station. NPS EN-5 ('Electricity Networks') will be particularly relevant for National Grid's separate application to connect the Power Station to the national grid electricity transmission network.

Both NPS EN-1 and NPS EN-6 conclude that the urgent need for new nuclear power generation has already been demonstrated and that the Wylfa NPS Site is potentially suitable as a location for a new nuclear power station (as discussed further in section 4.4 of this report).

All the NPSs were subject to an Appraisal of Sustainability (AoS) (as required by the Planning Act 2008), incorporating the requirements of the regulations that implement the Strategic Environmental Assessment (SEA) Directive (2001/42/EC). The primary function of the AoSs has been to provide an analysis of the environmental, social and economic impacts of implementing the energy NPSs by granting development consents in accordance with them.

The AoS for EN-1 states that the development of new energy infrastructure could potentially have some negative effects on biodiversity, landscape, visual amenity and cultural heritage; although the significance of effects and effectiveness of mitigation are uncertain at the strategic level at which the AoS is completed. Short term construction impacts along with potential negative effects on the economy are mentioned as well as potential cumulative negative effects on water quality, water resources, flood risk, coastal change and health at the regional or sub regional levels. The AoS concludes that mitigating the most significant negative effects should largely be possible, although impacts on landscape/ visual amenity can be hard to mitigate.

The comprehensive Strategic Site Assessment (SSA) process, undertaken by the Department for Energy and Climate Change (DECC) assessed the suitability of the candidate sites, considered for inclusion in NPS EN-6 (including the Wylfa NPS Site) in the following ways:

- In an AoS (as required by the Planning Act) that examined the potential positive and negative effects of developing the candidate sites and identified the significance of these effects, with suggested mitigation possibilities;
- In accordance with the European Habitats Directive, under which a strategic Habitat Regulations Assessment (HRA) was carried out on all of the candidate sites; and
- Against specific areas of concern raised at the site-specific level. For the Wylfa NPS Site these included potential environmental effects (especially on identified conservation sites; health; socio-economic effects; and seismic risk).

Appendix B provides a summary of the Government's assessment of suitability of the Wylfa NPS Site against the SSA criteria.

The AoS for EN-6 (Nuclear AoS) takes into account the findings of the AoS of EN-1. Its scope considered the environmental, social and economic effects of the NPS and was identified through analysis of relevant baseline information, understanding the planning policy context and responses to the scoping consultation. The appraisal itself was carried out as a staged process; by systematically using a set of sustainability objectives to identify and evaluate the potentially significant effects of the NPS on communities and environment and then predicting effects and suitable mitigation. These sustainability objectives were developed through consideration of the plans and programmes relevant to EN-6, the requirements of the SEA Directive and the responses to the consultation exercises.

The SEA Directive aims for a high level of environmental protection and promotion of sustainable development, an approach shared by the Nuclear AoS and the Wylfa Newydd Project EIA. It suggests a range of topics for assessing a plan (such as the NPS EN-6) including biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, landscape and the inter-relationships between these factors. All these topics were considered in the Nuclear AoS and therefore are key components of the Wylfa Newydd Project EIA and this Scoping Report. Notably, the Nuclear AoS considers socio-economic effects in the same way as environmental effects are required to be assessed by the SEA Directive, giving it equal weightage, another key thing of note to the Wylfa Newydd Project EIA.

In summary, the Nuclear AoS states that NPS EN-6 is likely to significantly benefit the government's targets for climate change, energy security and a low carbon economy. However adverse effects are predicted for nature conservation sites of European & national importance, designated landscapes, water quality, flood risk, biodiversity and communities. The exact nature and significance of the effects would need to be determined by the subsequent project level EIAs, such as the Wylfa Newydd Project EIA. Likely beneficial effects are associated with long term employment and community viability. Both the AoSs (of NPS EN-1 and NPS EN-6) provide important context and have helped inform the topic coverage and scope of the Wylfa Newydd Project EIA.

2.1.2 Welsh Planning Context

In Wales,'associated development' that supports the main NSIP development but is not an integral part of it cannot be included in the DCO. These elements of the project must instead be consented through separate planning applications to the local planning authority under the Town and Country Planning Act (TCPA) 1990.

For Wylfa Newydd, these TCPA applications for Associated Development will be made to the IACC and are expected to include, but may not be limited to, road improvements, off-site Temporary Worker Accommodation, Park and Ride facilities, Off -Site stores, a Logistics Centre, replacement Alternative Emergency Control Centre (AECC) and District Survey Laboratory (DSL) for Magnox Limited and a Visitor centre with media facilities. These applications will be considered and determined in the context of national (produced by Welsh Assembly Government) and local planning policy and guidance (produced by the IACC).

'Planning Policy Wales' (PPW) sets out the land use planning policies of the Welsh Assembly Government (WAG) and is supplemented by 21 topic based Technical Advice Notes (TANs). TANs prescribe the government's policies on various planning issues that shape the preparation of development plans. The principles and objectives of TANs prescribe the overarching national guidance for specific individual environmental topics. Both the PPW and TANs are material considerations in determining planning applications under the TCPA regime.

The chapters of PPW of particular relevance to understanding and assessing the possible environmental impacts of the Project's associated developments include:

- Chapter 4: Planning for Sustainability
- Chapter 5: Conserving and Improving Natural Heritage and the Coast
- Chapter 6: Conserving the Historic Environment
- Chapter 8: Transport
- Chapter 12: Infrastructure and Services
- Chapter 13: Minimising and Managing Environmental Risks and Pollution.

Additionally, the following TANs have also been considered relevant to the potential environmental impacts of these developments:

- TAN5: Nature Conservation and Planning
- TAN11: Noise
- TAN15: Development and Flood Risk
- TAN18: Transport
- TAN21: Waste.

2.1.3 Local Planning Policy

The local planning policy documents are vital in considering and determining the planning applications for associated developments made to the IACC for the Wylfa Newydd Project.

The statutory development plan for the Isle of Anglesey currently comprises the Gwynedd Structure Plan (1993) and Ynys Môn Local Plan (1996). The Gwynedd Structure Plan sets out the strategic approach to development for the period 1991 to 2006 and the Ynys Môn Local

Plan provides more detailed policies informed by the Structure Plan for the period 1991 and 2001.

As the periods covered by the extant development plan have expired, policies contained within these documents can be considered out of date. PPW advises that, in such circumstances, development plan policies should be given decreasing weight in favour of other material considerations, including the policies set out in PPW.

The stopped Ynys Môn Unitary Development Plan (2005) plan underwent independent examination by an Inspector but was not formally adopted by IACC. This document does not therefore form part of the development plan, but due to its advanced stage of preparation and more recent origin than the development plan documents it will nevertheless be a material consideration in the determination of the planning applications for the associated development.

A number of SPG documents have been published by IACC to further inform development plan policies. These documents will also be material considerations in the determination of the Associated Development applications. Of most relevance to the Wylfa Newydd Project is the 'New Nuclear Build at Wylfa SPG', which was adopted in July 2014. This document sets out the County Council's vision and objectives for the new nuclear development and is intended to:

- Inform the position which will be adopted by the County Council in its Local Impact Report and relevant section of the Statement of Common Ground (documents submitted to the DCO examining authority);
- Provide a planning framework that helps guide applicants and influences the design and development of the project to ensure sustainable outcomes, with a focus on associated development;
- Inform pre-application discussions related to the main nuclear new build site and associated development;
- Offer supplementary local level guidance consistent with the NPSs, which the examining authority and Secretary of State may consider relevant and important to the decision-making process; and
- Form a material consideration in the assessment of the Wylfa nuclear new build project elements that are subject to TCPA applications.

The development plan will be replaced on adoption of the Anglesey and Gwynedd Joint Local Development Plan 2011-2026, which is currently being prepared by the IACC and Gwynedd County Council. Consultation on the draft Deposit Plan was undertaken in February and March 2015 and it is anticipated the plan will be submitted to the Planning Inspectorate for independent examination early in 2016 with adoption by December 2016. Should the expected programme for adoption of the Local Development Plan be realised, then it is expected that the applications for associated development will be submitted to the IACC in advance of its adoption, but the plan will have been adopted at the time of the DCO application is lodged.

2.1.4 EIA Legislation

The size and nature of the Project is such that it requires formal EIA, and as an NSIP the EIA will be carried out under Schedule 1 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. EIA is the process of identifying, assessing and mitigating the effects that a proposed project may have on the environment. The output of the EIA process is

reported in a document known as an environmental statement. The final Environmental Statement for this project will accompany the DCO application.

The UK EIA Regulations derive from a 1985 European Union EIA Directive, amended in 1997, 2003 and 2009. A new Directive (2011/92/EU) was introduced in 2011, with changes brought into force on 14 May 2014 (EIA Directive 2014/52/EU). Member states are required to implement these changes by 16 May 2017. The UK Government will need to consult on revised or new Regulations to implement the changes prior to introduction. The timescale for this is currently unknown, though it is anticipated that the new Regulations are unlikely to be in force by the time the Wylfa Newydd Project DCO application is made in early 2017. Also if the projects are scoped prior to the transposition of the Directive the EIA is not required to comply with the new Directive. Nevertheless, in anticipation of this, this EIA for the DCO will take account of the following key changes that are expected:

i. Use of 'competent experts' to guarantee the completeness and sufficient quality of the environmental reports.
ii. Consult with determining authorities to ensure that 'sufficient expertise' is used in considering the Environmental Statement.
iii. Include additional topics in the list of effects to be assessed, including biodiversity, human health, climate change, vulnerability to disaster and the use of natural resources.
iv. Include comprehensive environmental mitigation and monitoring proposals along with a management plan to ensure that they are implemented.

Surveys and assessments are being carried out currently and will be fully reported to inform the HRA (or 'Appropriate Assessment') that will be undertaken by the Secretary of State before DCO consent can be granted. This will specifically assess the potential for any adverse effects from the construction, operation or decommissioning of the proposed Generating Station on the conservation objectives of existing or proposed Ramsar and European Sites (Special Protected Areas (SPAs) and Special Areas of Conservation (SACs)). These are international designations which protect the special interest of wetlands, wildlife habitats and protected species.

2.2 Nuclear Regulatory Context

The UK has a well-established regulatory regime that governs the nuclear industry. This ensures high levels of safety, security and environmental protection. Although separate from the land-use planning and its associated consultation process, key nuclear regulatory requirements will need to be satisfied before the Generating Station can be built and will continue to apply throughout its lifetime. A general summary is provided here for context.

At section 2.7, NPS EN-6 establishes that in coming to their conclusions on the DCO application, the examining authority and Secretary of State should act on the assumption that the relevant nuclear licensing and permitting regimes will be properly applied and enforced, and directs that they should not duplicate the consideration of matters that are in the remit of the relevant regulators.

2.2.1 Generic Processes

The UK ABWR nuclear reactor technology to be deployed at Wylfa Newydd is going through a generic regulatory assessment process required for new nuclear development. The key stages

are known as ‘Regulatory Justification’ and ‘Generic Design Assessment’. Successful completion of these generic assessments will facilitate the granting of a subsequent site-specific Nuclear Site Licence and a radiological environmental permit.

2.2.1.1 Regulatory Justification

The justification process requires that before any new 'type' of practice involving ionising radiation (such as a new type of nuclear power station) can be commenced in the UK, the Secretary of State must conclude that the economic, social or other benefits resulting from the practice outweigh the potential radiological health detriments. The Secretary of State granted the application for the justification of the UK ABWR in February 2015.

2.2.1.2 Generic Design Assessment

Generic Design Assessment (GDA) is the process being used by the nuclear regulators (the Office for Nuclear Regulation (ONR) and the Environment Agency (EA)) to assess the safety, security and environmental implications of new nuclear reactor designs, in advance of applications to build them at specific sites. The ONR is a public corporation that is responsible for (among other things) the regulation of nuclear safety and nuclear security at Nuclear Licensed Sites in the UK. Both of these nuclear regulators will issue reports on their findings at the end of the assessment indicating whether they consider the UK ABWR reactor design to be acceptable. Section 3.3 provides further details on the GDA process and the status of the assessment of the UK ABWR.

2.2.2 Site Specific Processes

2.2.2.1 Nuclear Safety

The safety of a nuclear installation in the UK is assured by a system of regulatory control based on a licensing process whereby the grant of a nuclear licence is used for a defined site and specified activities. A Nuclear Site Licence will be required for the Power Station under the Nuclear Installations Act 1965(NIA65) for the installation and operation of a nuclear power station. Nuclear Site Licences are granted by ONR and are legal documents, issued for the full life-cycle of a facility. They contain site-specific information, such as the licensee's address and the location of the site, and define the number and type of installations permitted. Under the nuclear site licence, ONR will control specific activities that that can affect the safety of a licensed site. These activities include, construction, installation, commissioning, operation, modifications and decommissioning of each generating unit plus the equipment, waste and fuel stores required to support them. Each Nuclear Site Licence will have a set of 36 standard Licence Conditions that the licensee must comply with. The Licence Conditions require licensees to make and implement adequate arrangements to ensure compliance. The Nuclear Site Licence and the attached Licence Conditions provide the principal legal basis for regulation by ONR of nuclear safety on licensed sites.

All safety systems have been designed in such a way as to account for conceivable internal and external hazards, such as seismic events (e.g. earthquakes), flooding, explosion pressure waves, electromagnetic interference, tsunami and aeroplane crash.

ONR will only permission activity when it is satisfied that the activity can be undertaken safely and bases its judgement on acceptably low nuclear safety risks being demonstrated and the licensee's organisational capability to effectively control that activity.

2.2.2.2 Site Security

The Health and Safety Executive (HSE), through its Office for Civil Nuclear Security (OCNS), is the security regulator for the UK's civil nuclear industry under the authority of the Nuclear Industries Security Regulations, 2003 (as amended). Horizon's security plans will need to be approved and monitored by the OCNS. Transporters of nuclear material to or from civil nuclear licenced sites must also be approved by OCNS.

2.2.2.3 Emergency Planning

The Radiation Emergency Preparedness and Public Information Regulations 2001 (REPPIR) require that arrangements are in place for responding to a nuclear or radiological emergency in advance of bringing nuclear fuel to the Power Station site. This will involve the development of emergency plans by Horizon and off-site emergency plans by the local authorities, with the support of emergency services and other bodies. These emergency plans will be subject to regular testing by the ONR, under the Nuclear Site Licence conditions.

2.2.2.4 Fresh Fuel and Radioactive Waste

The operation of the Power Station will require occasional delivery of fresh nuclear fuel to the Site. Radioactive wastes from the Power Station will be stored at the Site in specially designed facilities until they are transported in authorised packages for final disposal at licensed facilities. The use of all fresh fuel brought to and processed on site along with the storage, transportation and disposal of all radioactive wastes throughput the lifetime of the facility would be regulated by the ONR.

The management of radioactive waste and Spent Fuel is subject to regulation by the ONR through the Nuclear Site Licence conditions. Furthermore, Horizon would need to secure a permit for carrying out radioactive substances activities, water discharge activities and combustion activities in respect of the Environmental Permitting (England and Wales) Regulations 2010. This would require the implementation of measures to demonstrate control of radioactive material, whilst minimising the generation and accumulation of radioactive wastes. Horizon would also need to demonstrate that the radioactive waste and spent fuel arising from the Wylfa Newydd Generating Station could be safely and securely stored on-site until such time that it can be disposed to a national geological disposal facility (GDF).

2.3 Other Legislative Requirements

2.3.1 Environmental Permitting

Environmental permits will be required under the Environmental Permitting (England and Wales) Regulations 2010 to cover activities such as water discharges, combustion, the management of radioactive and non-radioactive wastes and non-radioactive and radioactive emissions to the sea and to the atmosphere. Each environmental permit will contain a series of

conditions, with which the operator must comply. In Wales, Natural Resources Wales (NRW) is the regulator for this environmental permitting regime.

NRW will use information from the GDA when assessing the radiological environmental permit applications. Specific requirements for the radioactive substances environmental permit ('EP-RSR') are set out in Schedule 23 to the Environmental Permitting (England and Wales) Regulations 2010, covering the keeping and use of radioactive materials, and the accumulation and disposal of radioactive waste.

2.3.2 Marine Licensing

Consents for the MOLF, the cooling water intake and outfall, and other works or structures in the marine environment will be assessed in accordance with the UK Marine Policy Statement, the Marine and Coastal Access Act 2009 and any relevant marine plans and policies. A marine licence is required under the Marine and Coastal Access Act 2009 before carrying out any licensable marine activity. In England it is possible to include the process for marine licensing within the DCO, but the devolution agreement means that this must be a separate application process in Welsh waters. The responsibility for marine licensing in Wales lies with the Welsh Government, but day-to-day authority has been delegated to NRW.

Licensable marine activities of relevance to the Wylfa Newydd Project include constructing works in the sea or on the sea bed, using a vehicle or vessel to remove any substance from the sea bed (carrying out dredging), and the deposition of any substance or object in the sea or on or under the sea bed (disposal of dredgings).

The marine licence applications will require EIA to be carried out under the Marine Works (Environmental Impact Assessment) Regulations 2007 as amended by the Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2015.The competent authority (NRW) will be required to undertake a HRA, under the 2010 Habitats Regulations (as amended).

2.3.3 Protected Species Licensing

Where protected species may be affected by the project, applications for European protected species licences (Conservation of Habitats and Species Regulations 2010) or conservation licence for protected species (Schedule 5 of the Wildlife and Countryside Act 1981) will be required as relevant.

2.3.4 Other Requirements

Further consents, permits and licences would also be required at various points prior to and through the main construction stage and for subsequent full operation and decommissioning of the Generating Station.

2.4 Connection to the National Electricity Grid

National Grid Electricity Transmission plc. will be responsible for obtaining the relevant regulatory approvals and consent for the works necessary to connect the Power Station to the national electricity transmission network.

The consent application for electricity grid connection works from the existing Magnox substation at Wylfa to Pentir is separate from Horizon's Wylfa Newydd DCO application. National Grid Electricity Transmission plc are responsible for making a DCO application for that project, known as the North Wales Connection. (Details of the preferred option for the project are detailed on the developer's websites at http://www2.nationalgrid.com/uk/In-your-area/Projects/North-Wales/ and http://www.northwalesconnection.com/ , and the DCO application is included on the National Infrastructure Planning website at http://infrastructure.planningportal.gov.uk/projects/wales/north-wales-connection/.)

3 Project Description

3.1 Introduction

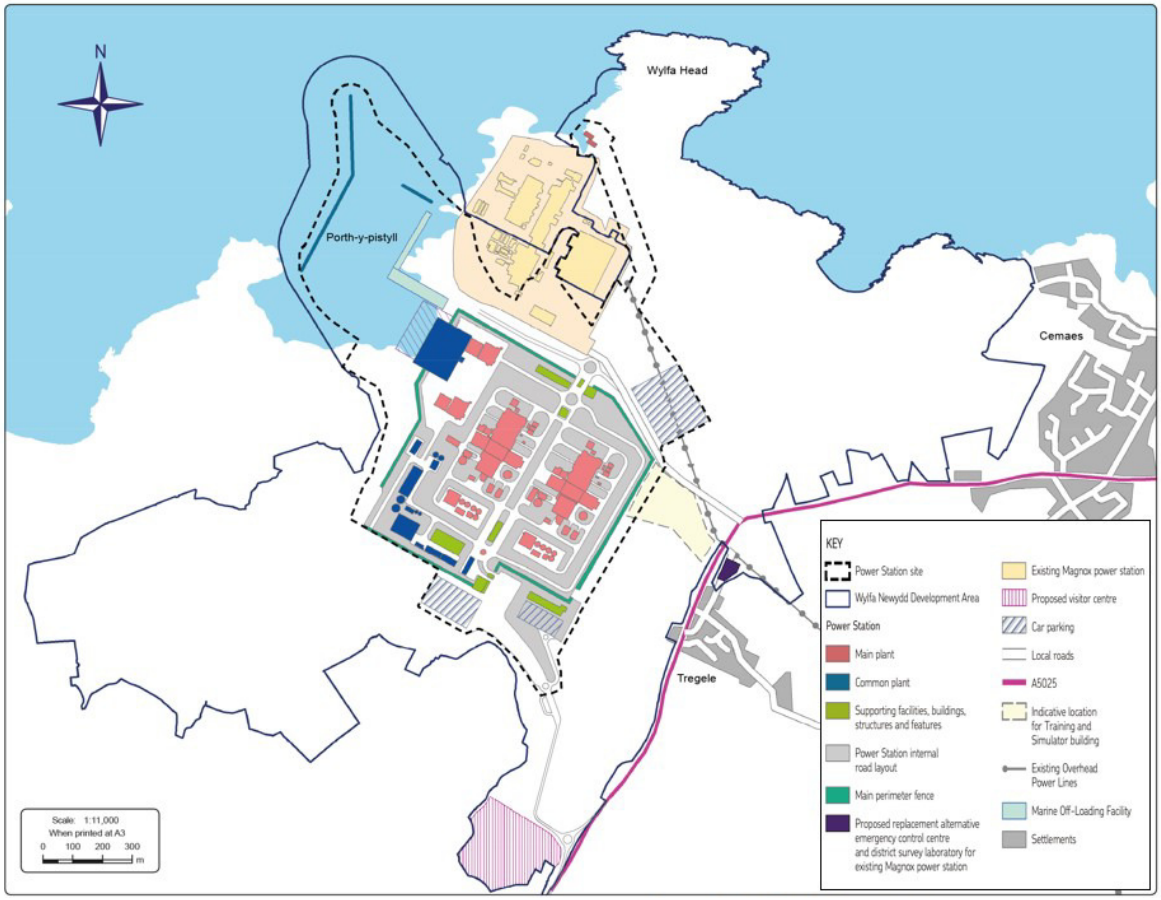
This chapter provides an overview of the main built components that comprise the Wylfa Newydd Generating Station and how they would function, first describing those that would be at the Power Station Site, then those that would be Off-Site together with how they interrelate.

3.2 The Power Station

The Power Station would include two ABWRs. This section provides a description of the main facilities, buildings and structures that would form the permanent development at the Power Station Site. The locations of these various groupings within the Power Station Site are shown in Figure 3.1. The buildings, structures and systems within the Power Station are arranged into the following groupings:

- **Main Plant** - those parts of the Power Station that are unitised, meaning that there would be one for each Unit and therefore two of each within the Power Station Site, comprising:
  - Unit 1 buildings, structures and facilities;
  - Unit 2 buildings, structures and facilities;
  - unitised radioactive waste buildings;
  - CWS (excluding common structures);
- **Common Plant** - those parts of the Power Station that service the generation of power but would be shared between the two ABWRs, including;
  - common radioactive waste buildings;
  - CWS common structures; and
- **Supporting Facilities, Buildings, Structures and Features** - those parts of the Power Station that are integral to the Wylfa Newydd Generating Station, but would not be process related.

Figure 3.1: Preferred locations of Wylfa Newydd Project components within the Power Station Site and surroundings



3.2.1 Main Plant

The Main Plant within the Power Station Site are all unitised, meaning that there would be two of each item- one for Unit 1 and one for Unit 2. The positioning and layout of the various structures and buildings comprising the Main Plant has been developed and optimised taking into account regulatory and design requirements, environmental constraints and technical analysis.

3.2.1.1 The reactor building and main stack

The reactor building is a key part of the distinctive cruciform structure of Unit 1 and Unit 2 and will be the tallest structure on the Power Station Site at approximately 44m. The building would have an emissions stack directly on top of it with an approximate height of between 70m and 80m, which would provide the discharge point for the off-gas system (see turbine building description) and for the main ventilation system that would service the main buildings (reactor building, turbine building and radioactive waste building

The reactor building would house the nuclear reactor, main steam supply and part of the steam supply tunnel, various safety systems, fuel handling equipment and spent fuel pool. The spent fuel pool would be used for the storage of new nuclear fuel and the storage of spent fuel immediately after it has been removed from the reactor, prior to transfer to the spent fuel store

after a period of cooling. The suppression pool would also be inside the reactor building. This would be used to cool steam released when depressurising a reactor, which would occur while shutting down the reactor, as well as in an emergency situation.

The plant in the reactor building would be supported by safety and auxiliary systems. Each Unit would be served by a number of auxiliary systems, notably water cooling systems, which remove heat from the plant auxiliaries in order to preserve the required functions during all modes of operation.

3.2.1.2 The turbine building

The turbine building houses all equipment associated with the main turbine generator. This includes part of the steam supply system that feeds into the turbine, the turbine generator itself, the main steam condenser and the off gas system. The off gas system processes gases from the steam that do not condense in the condenser. The system includes processes to reduce radioactivity in the gaseous phase prior to discharge to the environment via the main stack.

3.2.1.3 The service building

The service building would contain functions essential to the operation of the Unit, for example the personnel monitoring and welfare facilities. It would also contain other support functions for operation of the Power Station that must be located close to the Unit.

3.2.1.4 The control building

The control building will be situated between the reactor building and turbine building. It will contain the main control room for Unit, as well as some of the electrical switchgear and support systems needed to supply electrical power to the Power Station's auxiliary systems. The main steam tunnel from the reactor building to the turbine building would be located on the ground floor of the control building.

3.2.1.5 Heat exchanger building

The heat exchanger building is located close to the sea water intake to ensure proximity to the cooling water source. The heat exchanger building would contain the reactor building service water system and the reactor building cooling water system, as well as the turbine building service water system and the turbine building cooling water system. The systems would use seawater to cool essential plant and equipment, including the turbines and generators. They would also ensure reactor cooling during an emergency.

3.2.1.6 Filter vent building

The filter vent building contains the filtration and monitoring equipment necessary to ensure that the gases arising within the reactor building in an emergency situation to be vented from these areas and released into the environment safely. In particular, in the extremely unlikely event of abnormally high pressure within the reactor primary containment vessel, safety systems would automatically relieve the pressure by venting gases and steam to the atmosphere. This would be done via the filtered vent system, which would protect against harmful releases to the atmosphere.

3.2.1.7 Back-up buildings

The back-up building provides alternative safety management capacity during an emergency if the main control building and associated safety systems were not operational. This would include a diverse means of cooling the reactor core and spent fuel pool. The back-up building would be located to provide adequate separation from the reactor building and would include separate power and water supplies and truck-mounted alternate reactor cooling systems.

3.2.1.8 Standby AC power generation

Standby alternating current (AC) power generation will be required to provide power to the Power Station safety systems that would shut down and cool the reactor in the event of loss of power. This comprises:

- three emergency diesel generators per generating unit;
- two back-up building generators These will/would be located in the back up building; and
- one diverse additional generator per generating unit.

3.2.1.9 Condensate storage tanks

One condensate storage tank per Unit will be provided to store demineralised water that is used in the steam generation systems (reactor and auxiliary boilers), suppression pool and fuel storage pond.

3.2.1.10 Generator transformer and auxiliary transformers

The electrical energy created in each generator will need to be transferred to the National Grid high voltage electricity transmission network. The electricity produced will therefore need to be stepped-up to the transmission network voltage of 400 kilovolts for connection at the existing National Grid substation, adjacent to the Power Station Site. Each generating unit has a 'step-up' transformer, located near to the electrical generator. The power will be conducted, through buried cables or overhead lines, over the relatively short distance from the generator (step-up) transformer to the National Grid substation.

3.2.1.11 Gas storage facilities

Gas storage facilities would be located on the Power Station Site in order to store gases that would be used routinely in operational processes. These gases would be stored in suitably sized tanks or cylinders depending on the specific technical requirements and include the following:

- oxygen, which would be injected into the reactor feedwater to prevent corrosion of the reactor components;
- hydrogen, which would be used as a fill gas for the main generator and may also be used for feedwater injection;
- carbon dioxide, which would be used for purging pipework containing hydrogen prior to maintenance; and
- nitrogen, which would be used to provide an inert atmosphere inside the reactor secondary containment.

3.2.1.12 Suppression pool drain

Water stored in the suppression pool, which would be housed inside the reactor building, would condense steam. The condensed steam would then be returned to the reactor or to the condensate storage tank. The suppression pool drain tanks would be used periodically to allow the pool to be drained and inspected.

3.2.2 Common Plant

The Common Plant within the Power Station Site provide facilities or deliver functions that are shared between Unit 1 and Unit 2 of the Wylfa Newydd Generating Station. They are therefore integral to the generation of power.

Similarly to the Main Plant, there are certain radioactive waste buildings and CWS elements that are shared between the two UK ABWRs. These elements of the Power Station are drawn out separately towards the end of this section in order to allow a better appreciation of the way in which all aspects of the radioactive waste management and CWS, respectively, would function during operation. The principal facilities are listed below.

3.2.2.1 Circulating water biocide treatment plant

Biological control of the cooling water intake would be required to discourage growth of marine organisms within the CWS, known as biofouling. This process occurs in the circulating water biocide treatment building.

Control of biofouling in the CWS is likely to be by sodium hypochlorite dosing at a building located at the CWS intakes. Either sodium hypochlorite bulk storage or electrochlorination[2] of seawater would be used to provide the necessary chlorine dose, and the dose level would be controlled through the relevant environmental permit conditions to ensure an acceptable concentration of residual chlorine at the outfall, so that secondary dosing to neutralise residual chlorine content would not be necessary.

3.2.2.2 Demineralised water treatment plant

The demineralised water treatment plant will house the water treatment systems that will be used to make demineralised water required for various plant systems including the auxiliary boiler house. The building would be designed to accommodate the pumps, tanks, vessels and secondary equipment required to process mains water into demineralised water in a covered controlled internal environment. Water that is input to the building would be sourced from the local water supply to the Power Station Site.

3.2.2.3 Auxiliary boiler and tanks

The auxiliary boiler house is a facility to house the auxiliary steam supply boilers and associated equipment that would be used for plant start-up and operation of various loads requiring non-radioactive steam supply. The building would be designed to accommodate the boilers,

[2] electrochlorination is the process sometimes used to produce sodium hydrochlorite on demand by passing an electric current through sea water. The use of this process has the advantage of using materials readily available at the Power Station Site, namely sea water and electricity, therefore removing the need to transport sodium hydrochlorite to the Power Station.

secondary equipment and drain treatment process equipment required and would provide a covered controlled internal environment to house the equipment.

3.2.2.3 Fire water pump house

The fire water pump house building will accommodate the firewater pumps and electrical equipment required to supply pressurised water to the firewater main for the Power Station Site. Bulk water storage tanks would be located to the east of the building and would be fed by a local water supply, with at least two independent supply routes to give flexibility and redundancy, should one source of water fail.

3.2.2.4 Emergency response facility

Personnel, equipment and vehicles intended to respond to an incident with the Power Station Site, including fire response, will be housed within the emergency response facility.

3.2.2.5 Auxiliary boiler and tanks

The auxiliary boiler house is a facility to house the auxiliary steam supply boilers and associated equipment that would be used for plant start-up and operation of various loads requiring non-radioactive steam supply.

The building would be designed to accommodate the boilers, secondary equipment and drain treatment process equipment required and would provide a covered controlled internal environment to house the equipment.

The building would have a number of associated support facilities located in the vicinity of the boiler house including:

- fuel oil storage tanks;
- demineralised water treatment building;
- purified water storage tanks; and
- ancillary equipment inside the building.

3.2.3 Supporting Facilities, Buildings, Structures and Features

The Supporting Facilities, Buildings, Structures and Features would serve the entire Power Station and are integral to the Wylfa Newydd Generating Station.

3.2.3.1 Administration building

The administration building will provide office accommodation for up to 300 permanent personnel and up to 50 visitors.The building would form the main reception for invited visitors to the Power Station, as well as including canteen facilities, a dosimetry office and the primary document control centre for the Power Station.

3.2.3.2 Maintenance and workshop building

The maintenance and workshop building will incorporate workshop spaces for heavy and light mechanical, electrical and control and instrumentation activities and a cold laboratory. It would also provide office, welfare and occupational health space for maintenance staff, as well as

meeting facilities, a permit office, stores and maintenance planning facilities. The building would be occupied on a continuous basis.

3.2.3.3 Horizon Training and Simulator building

The purpose of the training and simulator building shall be to house two full scope simulators of the UK ABWR Units, together with a range of classrooms and training spaces. It will be located outside the inner site security boundary. The facility will be used as soon as it is available during Main Construction for staff training. The facility may be used 24 hours a day.

3.2.3.4 Site perimeter fence and entrance buildings

There would be an inner security fence and an outer security fence. The fences would comply with the UK Government standards and would require ONR-CNS approval. Each fence would be a double fence comprising (from the outside to inside):

- an outer clear zone, followed by the;
- outer perimeter fence, followed by;
- a sterile zone clear of obstructions, followed by the;
- inner perimeter fence, followed by;
- an inner clear zone.

The fences would be monitored by alarm systems and CCTV, and would have permanent perimeter lighting (see later sub-section).

Both the inner and outer security fences would have a main gatehouse as well as a secondary gatehouse, forming the entrance buildings to the Power Station Site.

3.2.3.5 Outage building

The outage building would provide canteen facilities, changing room facilities and welfare for day and night shift personnel; control centre; maintenance control centre; permit office; store and management office. The building would only be brought into use during periods of outage and would not be occupied during normal operational conditions.

3.2.3.6 MOLF

The MOLF would be required to facilitate the construction of the Power Station, and would therefore be constructed early on in the programme and be operational through the construction phase. It would comprise two purpose built quays to allow delivery of freight by sea, one for the delivery of aggregates and other bulk materials, and the other for large pieces of equipment known as Abnormal Indivisible Loads (AILs).

The MOLF infrastructure would be incorporated into the design of the north-eastern breakwater, which itself would be required, together with a second longer breakwater to the north-west of Porth-y-pistyll, specifically for the protection of the CWS intakes. The second breakwater of the CWS would also have the additional benefit of offering protection for vessels seeking to berth at the MOLF, particularly in stormy conditions, thus enhancing its availability for deliveries.

At least one of the two MOLF quays (the quay for the delivery of the large construction components including AILs) would also be retained for the operational phase of the Wylfa Newydd Generating Station, to provide berths to allow sea transportation for maintenance after

commercial operation, such as replacement of turbine rotors, generators and the other heavy equipment. The MOLF would therefore be a permanent structure within the Power Station Site and integral to the construction and operation of the Wylfa Newydd Generating Station.

3.2.3.7 Lighting

Power Station operational site lighting has not been fully defined at this stage. However, Horizon would adopt a graded approach such that lighting levels were appropriate to the local task and conditions. Excessive lighting levels would be avoided and wherever practical, dimming would be provided. Lamps would be chosen to balance energy efficiency and colour rendering whilst considering the need to avoid or minimise potential adverse effects to local environment and visual impact. LED use would be promoted and colour choice carefully selected to minimise impact. Lamps would also be chosen to prevent light spill and sky glow including high efficiency bulbs and directional lighting, and accessories such as barn door shields. Roadway lamps would be selected with a zero upward light component.

During operation it is likely that lighting would be required for permanent site roadways and car parks, for office buildings and for perimeter lighting of the security fence, which is a statutory requirement for nuclear sites. In addition, there would be a low level of pedestrian amenity lighting required across the Power Station Site to aid safe pedestrian movement.

Earth mounding and woodland planting would be provided within the Wylfa Newydd Development Area in order to screen views of the Power Station and lighting.

3.2.3.8 Landscaping

The permanent Power Station development would be subject to a landscaping scheme, which would be an important element of settling the building and structures into their setting.

3.2.4 Radioactive waste buildings

Radioactive waste will be generated during the operation of the Power Station, primarily due to nuclear fission of the fuel, activation of impurities in the reactor water and activation of corrosion products in the reactor circuit. In the UK, radioactive wastes are classified in terms of the nature and quantity of radioactivity they contain and the heat they produce, as defined below.

- Low level waste (LLW): waste that has a radioactive content not exceeding 4GBq (giga-becquerels) per tonne of alpha activity, or 12GBq per tonne of beta / gamma activity.
- Intermediate Level Waste (ILW): wastes exceeding the upper boundaries for LLW but that do not require heat generation to be taken into account in the design of storage or disposal facilities.
- High Level Waste (HLW): waste that is sufficiently radioactive for its decay heat to significantly increase its temperature and the temperature of its surroundings, such that heat generation has to be taken into account in the design of storage and disposal facilities.

The Power Station Site layout includes a number of radioactive waste buildings and structures, as listed in table 3.1 below.

Table 3.1 List of radioactive waste facilities

Building/structure	Building/structure
Main Plant – unitised radioactive waste facilities	
Radioactive waste building	Wet LLW processing facility
Common Plant – radioactive waste facilities	
Solid LLW processing facility	ILW storage facility
Dry HLW decay storage facility	Spent fuel storage facility
Wet ILW processing facility	

3.2.4.1 Radioactive waste building

The purpose of the Radioactive Waste Building is to house the liquid waste management system and the wet ILW and LLW buffer storage tanks. There will be one radioactive waste building per Unit, which will be constructed during the Main Construction stage and be available for use during commissioning, operations and decommissioning. This facility would vent any aerial discharges via the main stack, in accordance with the limits established through the environmental permit that Horizon would need to hold. There would be liquid effluent discharges from the liquid waste management system to the sea. Liquid effluent would be treated by the liquid waste management system, if required, prior to discharge via the cooling water outfall.

3.2.4.2 Wet Solid ILW processing facilities and Wet Solid LLW processing facilities

The wet ILW and wet LLW processing buildings will be located adjacent to the Radioactive Waste Building. They will collect and process materials such as bead resins, evaporator concentrates, powder resins, together with sludge / crud.

The purpose of the facilities is to receive wet solid ILW and LLW from the Radioactive Waste Building buffer storage tanks and immobilise it in cement in packages suitable for disposal as ILW and LLW respectively. There will be one Wet ILW Processing Facility and one Wet LLW Processing Facility per Generating Unit. Both of these facilities will vent any aerial discharges via the main stack in accordance with the limits established through the environmental permit. Liquid effluent from emergency showers and hand washing facilities will be transferred to the HCW system for treatment if required. There are no expected liquid radioactive discharges from the encapsulation process.

3.2.4.3 Dry Solid ILW processing facilities and Dry Solid LLW processing facilities

There will also be one dry LLW processing facility that receives dry LLW generated across the Power Station Site, where it would be processed and packaged for disposal. There would be one shared dry LLW processing facility for the two Units and this would be constructed during the main construction phase of the Wylfa Newydd Project, available for use at the start of operations.

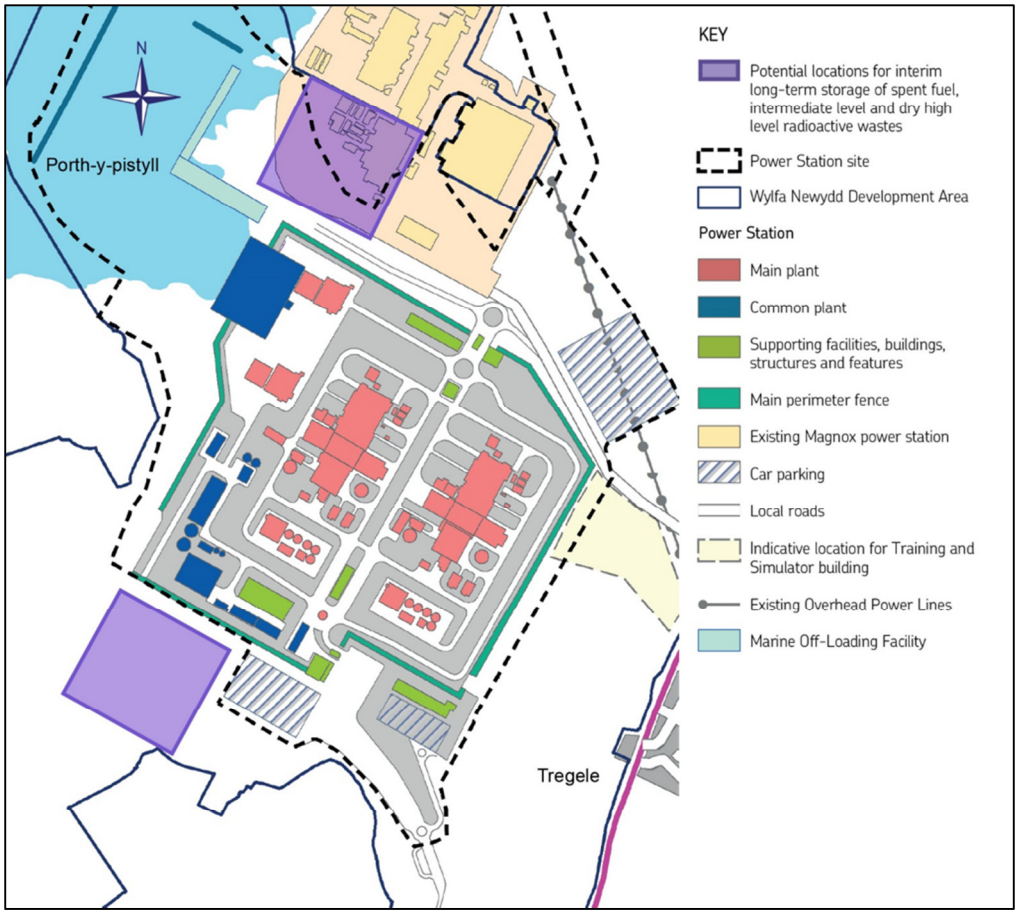
Solid radioactive wastes will arise from reactor operations and will include control rods and spent reactor components. Due to the amount of radiogenic heat emitted by these components they will initially be classed as High Level Waste (HLW) and will initially be cooled in the fuel pool before being transferred into casks for storage in the HLW Decay Storage Building.

Following a period of decay storage a solid ILW processing facility will be required for the receipt, un-casking, size reduction, packaging and cement encapsulation of the wastes as ILW suitable for disposal. There would be one shared dry ILW processing facility for the two Units and this would be constructed after the main construction phase of the Wylfa Newydd Project, due to the period of pool cooling and decay storage before the facility is required.

3.2.4.4 Radioactive waste storage buildings

Additional radioactive waste buildings are required to serve the whole Power Station, namely the Spent Fuel Storage Building, the ILW Storage Building and the dry HLW storage facility. Two areas for the location of these radioactive waste storage buildings are being considered. One is located immediately to the south-west of the Power Station Site while the other is located to the north of the Power Station Site on land currently occupied by the existing Magnox power station and owned by the NDA. The indicative locations of these buildings are shown in figure 3.2.

Figure 3.2: Indicative locations for spent fuel, ILW and HLW storage



The Spent Fuel Storage Building receives spent fuel casks from the reactor buildings, for storage prior to disposal to the proposed GDF. There will not be any aerial or liquid discharges from this facility, though a small stack may be required (approximately 3m above the ridge line) to aid ventilation of the facility to control environmental conditions.

The ILW Storage Facility receives ILW packages from the Wet ILW Processing Facility, for storage prior to disposal to the GDF.

The dry HLW decay storage facility receives HLW casks from the reactor building, for storage prior to disposal to the GDF. It may require a small stack some 3m above the ridge line, to aid ventilation of the facility to control environmental conditions.

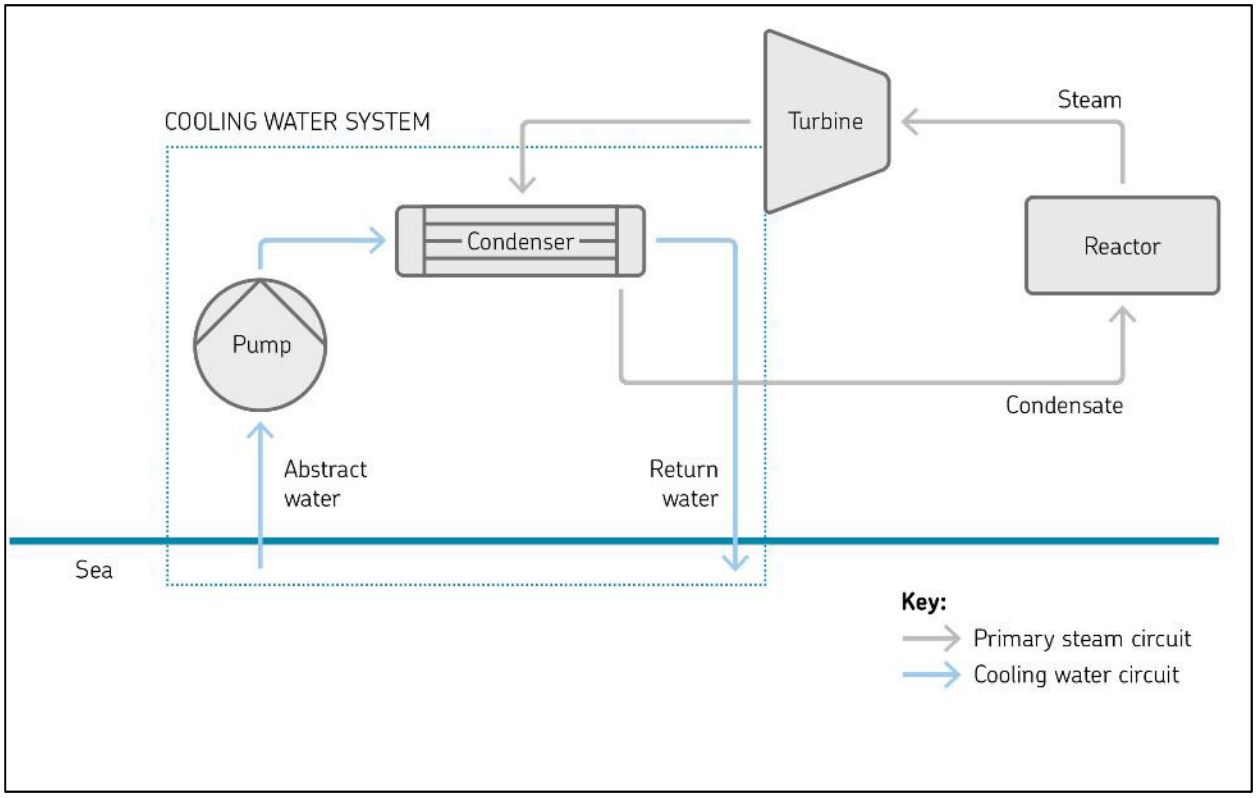
3.2.5 Cooling water system and breakwaters

Cooling water (CW) is used to condense the steam leaving the steam turbine. The CWS would draw water directly from the Irish Sea and this water would then pass through screens before being pumped to the condenser. The CWS requires the following:

- CW intake structure and pumphouse (to draw cooling water in from the sea), including screening and fish protection systems;
- breakwater structures to offer necessary weather protection to the CW intakes, including calming the water during stormy conditions;
- CW pipes from the intake structure and pumphouse to the turbine buildings, which would be buried – there would be a set of these for each Unit;
- seal pits (to prevent vacuum conditions in the CWS during low tide periods), one for each Unit;
- outfall tunnels, to transfer water from the seal pits to the outfall structure. These structures would be buried – there would be a set of these for each Unit; and
- CW outfall structure (to return cooling water to the sea).

Taking into account the particular characteristics of the Wylfa Newydd Development Area, as well as EA guidance, Horizon has elected for a once-through water cooling system, using seawater abstracted from the Irish Sea. This is the option promoted in NPS EN-6 (see figure 3.3). The sea currents provide very good mixing of water that would effectively disperse any localised heating of the sea associated with discharged CW. The dispersion created by the currents at the outfall would minimise the recirculation of discharged water directly back into the CW intake.

Figure 3.3 Diagram of once-through water cooling system



The CWS would draw water directly from the Irish Sea and this water would then pass through a series of drum screens before being pumped to the condenser. The screens, pumps and supporting systems would be located on and behind the Porth-y-pistyll foreshore, in the CW intake and pumphouse structure. On leaving the condensers of each Unit, CW would flow to a seal pit before discharging to the sea under gravity via the CW outlet tunnels and the outfall, which would most likely be to south-west of Wylfa Head, at the site of the outfall from the Existing Power Station.

In addition, there would be two smaller and separate seawater cooling water systems (the turbine building service water system and the reactor building service water system) extracted through separate inlets in Porth-y-pistyll. Each of these systems would use seawater flowing through heat exchangers to remove heat from closed-loop circuits, which cool turbine building components and the reactor building components. (These systems are termed the turbine building cooling water system and reactor building cooling water system systems, respectively). The seawater would pass through the heat exchangers in these two systems and then join the main CW outfall.

3.3 Reactor Technology

The 2009 EIA Scoping Report identified that Horizon was considering the use of the AP1000 and UK-EPR reactor designs. Following the acquisition by Hitachi in November 2012, Horizon intends to deploy the UK ABWR nuclear reactor design, which will be a UK specific version of the ABWR reactor technology that is already in use in Japan.

Following the UK Government's 2006 Energy Review 'The Energy Challenge', the ONR and the EA developed the GDA process to allow assessment of new nuclear power station designs. The process is non-site-specific and allows the regulators to assess the safety, security and environmental implications of new nuclear reactor designs, separately from applications to build them at specific sites.

As a new reactor technology to the UK, the UK ABWR is being assessed through the GDA process. The first three steps (i.e. Step 1: Preparation of the design, safety case and security submissions; Step 2: fundamental design, safety case and security claims overview; and Step 3: a review of the safety case arguments of the proposed reactor design and the related security aspects) have been successfully completed, with Step 3 completed on 30 October 2015. Step 4 (the detailed assessment phase where evidence provided to support safety claims and arguments is analysed) in now in progress and will continue to Dec 2017.

One of the world's most common types of nuclear power generating plants, Boiling Water Reactors (BWRs) are characterised by a system wherein steam is generated from ordinary water inside the reactor by heat generated through the thermal nuclear fission reaction. The development of the ABWR began in 1978. The first ABWRs to be constructed were unit 6 and unit 7 of the Kashiwazaki-Kariwa Nuclear Power Station (KK-6 and KK-7), which are owned and operated by the Tokyo Electric Power Company. The two reactors, KK-6 and KK-7, commenced commercial operation on 7 November 1996 and on 2 July 1997, respectively. The majority of equipment for both the KK-6 turbine island and the KK-7 nuclear island were supplied by Hitachi Ltd.

The UK ABWR has been designed with the aim of simplifying the design and operation of the plant compared to the original BWR technology as well as enhancing the safety and reliability of Structures, Systems and Components. Some of the major ABWR improvements and differences relative to previous BWRs include [GA91-9101-0101-09000 A, Section 9.1.2, Para 1]:

- improvement of safety and reliability;
- improvement of capacity factor;
- reduction of radiation dose to which workers are exposed; and
- improvement of operability and maintainability.

3.4 Site Access

Horizon intends to create a new Power Station Access Road to permanently connect to the A5025 to the Power Station Site, as well as provide access to the wider Wylfa Newydd Development Area for Main construction activities. Construction of this road will commence early in the Main Construction stage.

In the PEI Report at PAC1, the likely route was proposed leave the A5025 just to the south of Tregele so that construction freight traffic using the Designated Freight Route would turn off before reaching the settlement However, with further design, it was realised this junction location was sub-optimal due to the gradient on the A5025 approaching the junction creating a stopping hazard. An alternative junction location is now proposed 300m to the South of the original location, just North of Groesfechan. The proposal is based on a design speed of 40mph/70kph and will rely on a local speed restriction to satisfy highway design criteria.

Furthermore, following a consideration of the range of potential junction designs, a roundabout has been identified as the preferred solution since it introduces inherent traffic calming, assists with appropriate prioritisation of traffic movements and allows safer access to the proposed Visitor Centre than would be achieved with a different design.

3.5 Connection to the National Grid

The electrical energy created in each generator would be transferred to National Grid via the existing 400Kv substation. The local connection is described above section in 3.2.1.10. The connection from the 400Kv substation into the National Grid is a separate project and is the responsibility of National Grid Electricity Transmission plc.

3.6 Utilities

There will be a requirement for a water supply to the Power Station Site during operation to meet the following Project needs:

- process water requirements;
- potable water requirements; and
- firewater requirements

Dwr Cymru, Welsh Water (DCWW) and Horizon are working collaboratively to determine water supply requirements to support both the construction and operation of the Wylfa Newydd Generating Station.

Electricity for the Power Station construction would be derived from the existing 132Kv substation and will include a substation within the Wylfa Newydd Development Area to transform the electricity to 11Kv

The need for improvements to the sewerage system to meet anticipated Project demand is also under discussion with the DCWW.

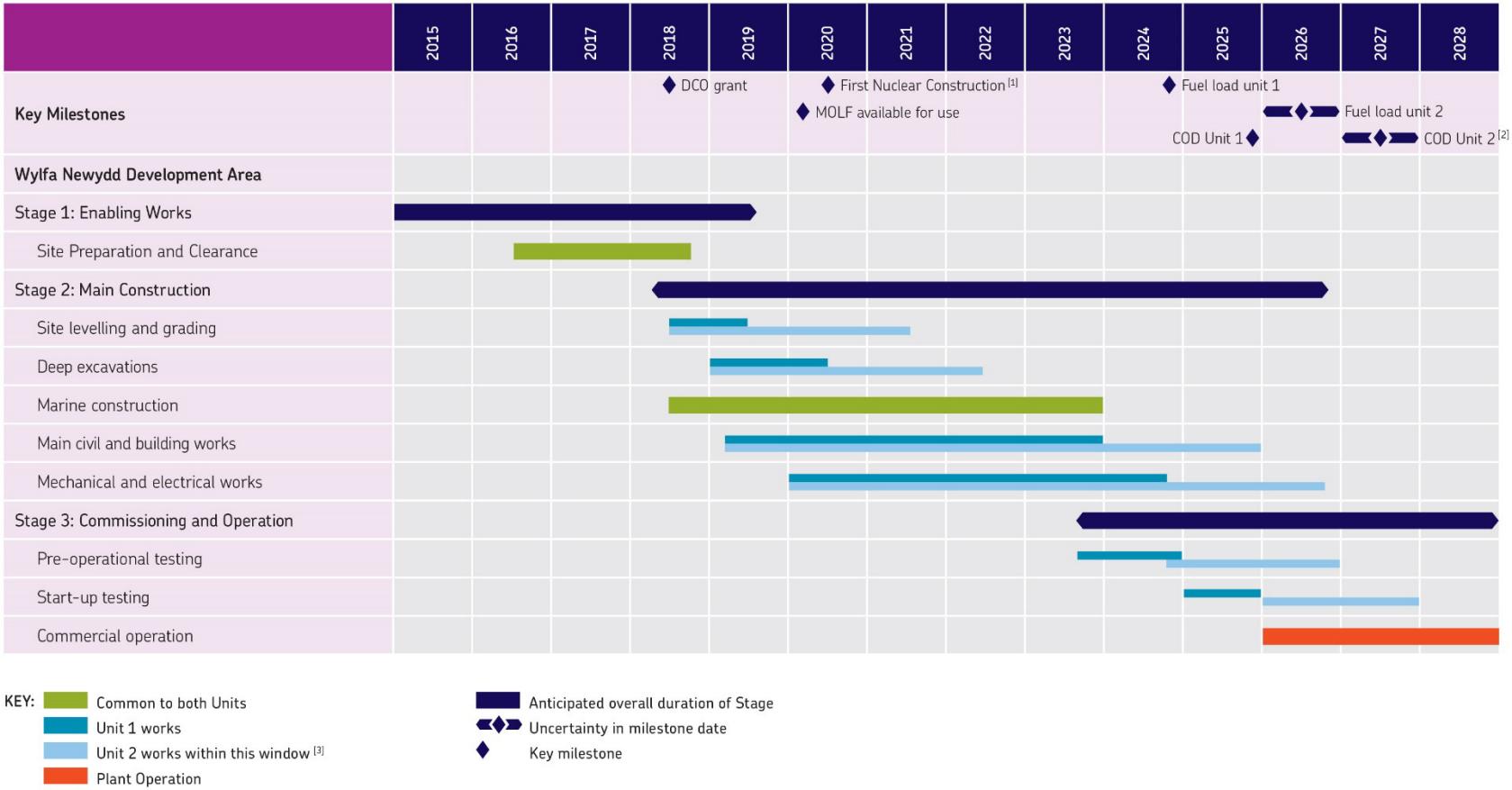
3.7 Outline of Construction Activities

The Project is divided into four main stages. The first two stages cover the construction of the site:

- Stage One: Enabling Works
- Stage Two : Main Construction
- Stage Three: Commissioning and Operation
- Stage Four: Decommissioning

Figure 3.4 provided an indicative high level timeline that shows the sequence of the activities for the main built components of the Wylfa Newydd Project.

Figure 3.4: Indicative construction programme



[1] First Nuclear Construction (FNC) target is Jul 20. FNC may be as late as Nov 20.
[2] Commercial Operation Date (COD) for Unit 2 will be 12 to 24 months after Unit 1. COD Unit 2 may therefore be as early as Dec 26 or as late as Dec 27.
[3] Optimisation of construction schedule to introduce efficiencies between Units yet to be completed.

3.7.1 Stage One: Enabling Works

Wylfa Newydd Development Area

A series of works is programmed to commence prior to the Main Construction Stage. These enabling works are needed to prepare the Wylfa Newydd Development Area for the construction of the Power Station in order to ensure the earliest possible commissioning and power generation. The activities are likely to include:

- demolition of existing buildings;
- installation of construction site boundary fences and diversions of public rights of way (PRoW);
- tree felling, vegetation clearance and dry stone wall dismantling and storage;
- top soil clearance and storage;
- installation of initial drainage for Enabling Works;
- removal of rock outcrops;
- watercourse diversion;
- construction of haul roads, plant compounds, car parks and offices;
- installation of services; and
- construction of replacement alternative emergency control centre and district service laboratory for the Existing Power Station AECC and DSL for Magnox Limited

3.7.2 Stage Two: Main Construction

Following sufficient progress of Enabling Works and the grant of the DCO, the Main construction stage of the Wylfa Newydd Project would commence. These three elements would overlap to some degree as a two unit construction schedule progresses. Work will initially prioritise Unit 1 with consideration given to efficiencies between units. The activities at the Wylfa Newydd Development Area during this stage are presented in three elements:

- Site establishment and levelling and deep excavations to form working platforms for construction of the main foundations of the Power Station;
- Main building construction activities (including reinforced concrete foundations, building sub-structure and super-structure, Power Station Site roads, mechanical and electrical installation) and construction and non-active commissioning of each generating unit; and
- Final landscaping and demobilisation (progressively delivered through Main Construction, in accordance with the Landscape and Environmental Masterplan (LEMP)).

3.7.3 Stage Three: Commissioning and Operation

Commissioning is defined as a progressive testing stage between the erection and installation of the Power Station and the start of normal operation. Commissioning is expected to last approximately 26 months per Unit, which would demonstrate that the Power Station has been built as designed and operates exactly as designed.

The commissioning stage is broken into three phases:

- construction testing;
- pre-operational testing; and
- start-up testing.

The operational life of the Power Station is anticipated to be 60 years. The final UK ABWR design has not gone through the whole of the GDA process therefore the design continues to evolve and some parts of the safety case and design may change

3.7.4 Stage Four: Decommissioning

At the end of the 60 year operating stage, the Wylfa Newydd Generating Station would be decommissioned. The decommissioning of a nuclear power station is subject to guidance and regulation at various international and national levels. The objective of decommissioning is to convert a nuclear site from its operational state to an end state that is agreed with the relevant authorities and regulators. This is, in simple terms, a progressive process of controlled hazard removal, demolitions and, if considered required, land remediation. Once the end state is achieved for a nuclear site or parts of a nuclear site, it is then expected that regulatory controls would be removed to allow the land to be used for new purposes, which can be non-nuclear related. Decommissioning of the Power Station is estimated to last for approximately 20 years.

Decommissioning does not form part of the Wylfa Newydd Project DCO application. The actions required would equate to a large and complex deconstruction project, commensurate with the scale of the Main Construction activities, and typically include:

- Defuelling of the nuclear reactors;
- Removal of all materials used in operational plant, systems and facilities;
- Removal and disposal of radioactive and hazardous materials to Off-Site disposal or designated storage within the Power station Site;
- Demolition of buildings and structures;
- Transfer of stored ILW and Spent Fuel to GDF; and
- Delicensing of the Power Station Site (so that it is not a nuclear licenced site). This allows for alternative uses in the future.

Horizon's strategy for decommissioning is under discussion with the relevant regulators and will be subject to further development work, monitoring and review as the Project evolves. It is anticipated that Horizon would need to undertake an EIA under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (as amended) in advance of commencing decommissioning. Therefore, decommissioning activities will be covered only to a certain extent within the Environmental Statement.

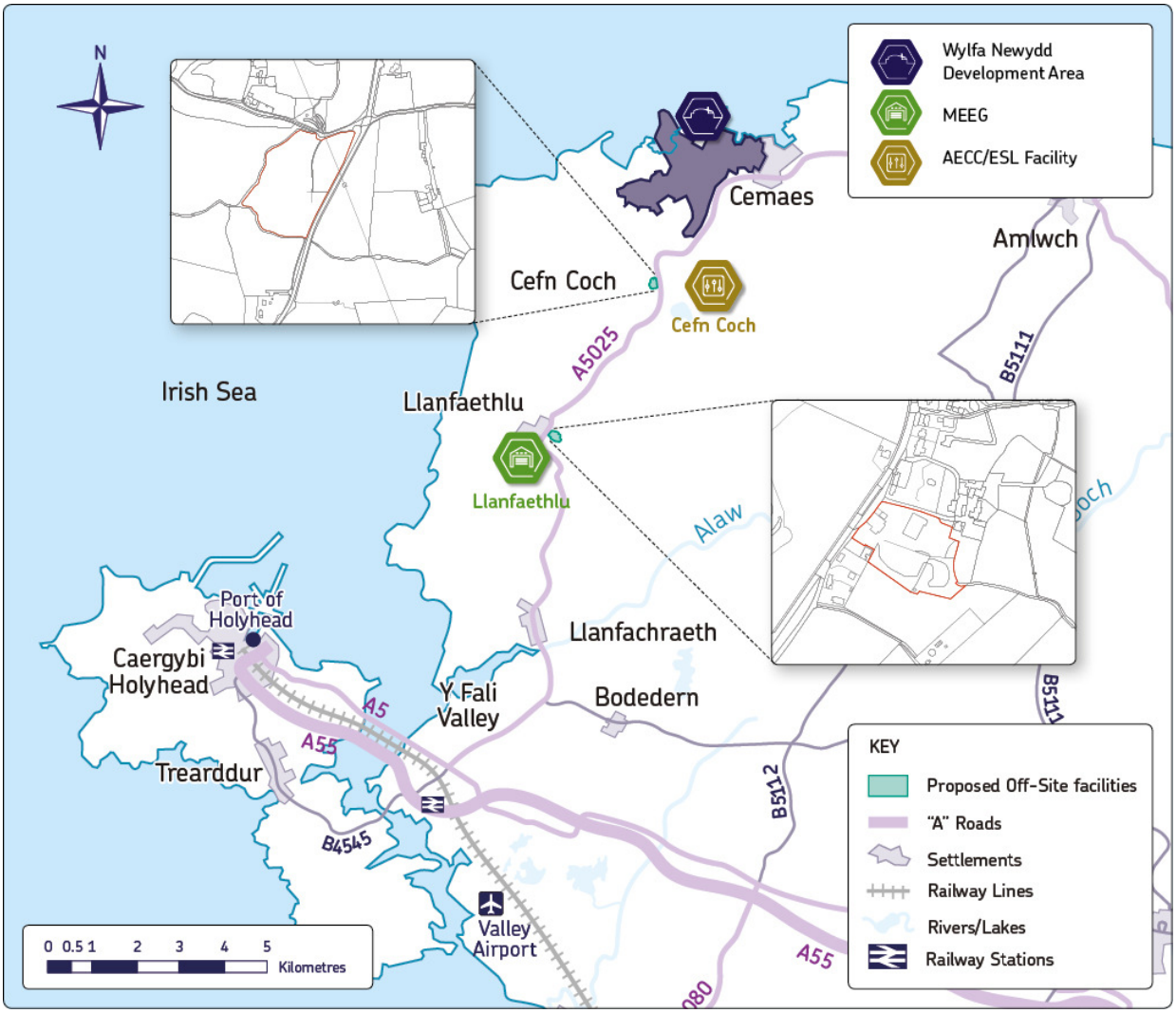
3.8 Off-Site Facilities

In order to provide resilience against extreme events with very low probabilities, Horizon is required to develop some facilities that would be physically separate from, but local to, the Power Station Site.

The Off-Site Power Station Facilities are an integral part of the Wylfa Newydd Generating Station, they will be included in the application for a DCO and would be located Off-Site to

complement the facilities that would be within the Power Station Site. See figure 3.5 for the proposed locations.

Figure 3.5: Indicative distribution of Off-Site Wylfa Newydd Project components



3.8.1 Alternative Emergency Control Centre and Environmental Survey Laboratory

The Alternative Emergency Control Centre (AECC) would provide back-up command and communications facilities that would be used to remotely manage an incident at the Power Station Site in the extremely unlikely event that the primary facilities on the Power Station Site were unavailable. In this capacity, the AECC would be occupied by the emergency controller, technical support team and support staff who would be able to use the facility to continue to provide strategic control of the Power Station Site and to liaise with the Local Authority and Emergency Services at their Strategic Coordination Centre. The Strategic Coordination Centre, hosted at regional police headquarters in North Wales will control the off-site response of the emergency services and other local agencies to ensure protection of the public.

The Environmental Survey Laboratory (ESL) would provide facilities to manage radiological survey in the local area, including radiation monitoring equipment controls. There would be equipment for analysing samples and assessing the implications for the public and the

environment both under normal operation and during an emergency situation. A small number of vehicles would need to be based at this facility and there would also be communication connections to the Power Station Site.

It is common practice for AECC and ESL functions to be co-located and this is the approach Magnox Limited has adopted for the Existing Power Station. Horizon therefore also plans to co-locate the AECC and ESL in a single building.

Horizon has identified the parcel of land shown in figure 3.5 as the most suitable location, taking the locational requirements into consideration.

Typical activities identified for the construction and operation stages of the AECC and ESL are set below:

Construction

- site clearance;
- vegetation clearance if required;
- diversion of public footpaths;
- formation of construction site compound(s);
- installation of construction site boundary and security fences;
- creation of site welfare facilities, construction plant and traffic movements;
- earthworks and excavation activities;
- drainage works;
- utility diversions;
- construction of AECC and ESL buildings;
- access and parking area construction and surfacing;
- signage and lighting installation;
- management of waste and other materials;
- landscaping; and
- environmental mitigation works, including noise insulation if required, dust control measures and habitat creation if required.

Operation

- AECC would require routine maintenance staff and would be fully occupied for training and if required for an incident at the station;
- arrival and departure of a small number of staff (approximately six) required to operate the ESL;
- deliveries by light vehicles of consumables for the operation of the facility and daily samples for testing in the laboratory;
- commissioning and testing of emergency back-up generators; and
- waste management.

3.8.2 Mobile Emergency Equipment Garage

In common with recent additions to other nuclear sites, Horizon would retain a number of specialist vehicles at a location close to but separate from the Power Station Site, which would allow them to be rapidly deployed if needed to support an incident. This facility would be called

the Mobile Emergency Equipment Garage (MEEG) and may also be used as a marshalling point for support arriving on Anglesey before onward dispatch to the Power Station Site in an emergency situation.

The preferred site for the MEEG has been identified towards the the northern end of Llanfaethlu, a parcel of land currently in use as a maintenance garage for commercial and heavy goods vehicles (HGVs) (see figure 3.5 for proposed location).

Typical construction and operational activities identified associated with the MEEG are:

Construction

- site clearance;
- vegetation clearance if required;
- formation of construction site compound(s);
- installation of construction site boundary and security fences;
- creation of site welfare facilities;
- construction plant and traffic movements;
- earthworks and excavation activities;
- drainage works;
- utility diversions;
- construction of MEEG building;
- access and parking area construction and surfacing;
- signage and lighting installation;
- management of waste and other materials;
- landscaping; and
- environmental mitigation works if required.

Operation

- occasional repair and maintenance;
- commissioning and testing of emergency back-up generators; and
- waste management.

4 Consideration of Alternatives

The Infrastructure Planning (Environmental Impact Assessment (EIA) Regulations 2009 (Infrastructure EIA Regulation) require that an environmental statement should include an *"…outline of the main alternatives studied by the applicant […] and an indication of the main reasons for the choice made, taking into account the environmental effects*".

The Environmental Statement for the Generating Station will provide a full description of alternatives considered for the Generating Station, including the 'do nothing' scenario, alternative locations, layouts, technologies and systems. This section provided a summary of the main alternatives considered and the Generating Station decisions made to date, taking into account environmental effects, economic, commercial and technical feasibility.

4.1 The 'Do Nothing' Scenario

The do nothing scenario considers not taking forward any development proposals associated with the Wylfa Newydd Project. The principal implications of the 'Do Nothing' scenario are considered to be as follows:

- Avoidance of environmental effects
- Failure to meet the UK Government's energy policy objective
- Loss of economic development opportunity for Anglesey and North Wales
- Loss of Potential Future Legacy and benefits resulting from the Wylfa Newydd Project

4.2 Alternatives to Nuclear and Large Scale Electricity Generation

The UK Government considers that there are benefits of having a diverse mix of types of power generation on the basis that being dependent on any one source of fuel reduces the security of power supply. Within NPS EN-1, the UK Government has considered the alternatives to the need for new large scale electricity generation infrastructure (including nuclear power) including reducing overall demand, more intelligent use and additional interconnection of electricity systems. NPS EN-1 concludes that, although all of the above measures should and will be actively pursued, their effect on decreasing the need for new large scale energy infrastructure will be limited, particularly given the likely increase in demand for electricity for domestic and industrial heating and transport.

4.3 Site Selection

In 2009, the area of land surrounding the Existing Power Station was nominated in the UK Government's SSA process as a site potentially suitable for the deployment of a new nuclear power station. In implementing the SSA process, DECC assessed a total of eight candidate sites against a wide range of factors.

The outcome of the comprehensive assessments is that NPS EN-6 (specifically covering nuclear power generation) states that the land that Horizon refers to as the Wylfa NPS Site meets the SSA criteria. NPS EN-6 does set out a number of areas that will require further consideration by Horizon, in light of evidence from, for example, the public, regulators, the AoS and the strategic HRA site reports. Notwithstanding this, the UK Government concluded that

the Wylfa NPS Site is a potentially suitable site for the deployment of a new nuclear power station.

4.4 Location within the Wylfa NPS Site

A number of potential locations for the Power Station within the Wylfa NPS Site were considered by Horizon. The selected location, which is referred to in the PEI Report as the Power Station Site, is described in chapter 2. It is, in general terms, unchanged from the general area described in Horizon's Stage One pre-application consultation.

This location was chosen for several reasons including existing constraints within and surrounding the Wylfa NPS Site, interfaces with the Existing Power Station, relative height above sea level, overall topography and screening opportunities, constructability, and ease of access and proximity to key environmental receptors including residential settlements. The main disadvantage of the selected location is that development to the south of the Existing Power Station, as opposed to elsewhere within the Wylfa NPS Site, results in a relative increase in the scope of excavation works due to the nature of the drumlin landscape in that area.

Horizon has identified areas of land immediately to the south and east of the Power Station Site to be used as the main construction compounds. Consideration included proximity of the workface to the Power Station Site Units 1 and 2 to minimise transfer distances, construction efficiency, reduction in the amount of land used, potential for efficient management of environmental effects (e.g. noise, dust and intrusion) and minimising interfaces with planned decommissioning of the Existing Power Station.

4.5 Cooling System

Horizon has selected a once-through CWS for the Power Station, using seawater abstracted from the Irish Sea.

In assessing the suitability of adopting a direct cooling system versus an indirect cooling system at Wylfa, consideration has been given to the guidance stated both in NPS EN-1 and NPS EN-6; the European Commission's Best Available Technology (BAT) reference document on industrial cooling systems and the EA's guidance on 'Cooling Water Options for the new Generation of Nuclear Power Stations in the UK'.

There are a variety of indirect cooling options that involve tower cooled systems. In a tower cooled system, heat is rejected by evaporation and conduction to the air. The abstraction and discharge from a tower cooled plant will be lower than that from a direct cooled system and direct effects on the aquatic environment will be lower.

Air cooling with its associated costs in terms of efficiency loss, capital and land take is considered to be less favourable as a cooling system for a coastal site such as for Wylfa Newydd Project and has not been included in the options appraisal.

The range of options for CWS abstraction and intake structures and location have also been assessed. Horizon has selected an onshore intake structure located within Porth-y-pistyll protected from storm conditions by breakwater structures. Horizon's preferred outfall location is

at the similar location to the Existing Power Station outfall, with an alternative location a short distance to the north.

4.6 Marine Off-Loading Facility Options

Horizon will create a Marine Off-Loading Facility (MOLF) within Porth-y-pistyll which will allow vessels to berth and unload their cargo directly within the Wylfa Newydd Development Area. Against the three alternative locations considered in close proximity to the Wylfa Newydd Development Area, the assessment informed chosen location within Porth-y-pistyll would: benefit from the calming effect of the breakwater structures, which are required for the cooling water intake; minimise the need for heavy haul routes across the Wylfa Newydd Development Area; reduce transfer distances between the offloading point and workfaces; and reduce the visual effect of the MOLF in isolation, as it would be set against the backdrop of the Power Station buildings and structures. The Porth-y-pistyll location, being adjacent to the Main Plant, also offers greater opportunities for future use during the Operation stage of the Project.

4.7 Operational and emergency arrangements

Horizon has been further developing the overall concepts of emergency preparedness arrangements. In particular, the requirements for Off-Site Power Station Facilities in support of these arrangements, which have been discussed with ONR, have been clarified in terms of function and size. This has allowed the progression of the site selection process for these facilities; namely the AECC, ESL and MEEG.

The AECC and ESL would be a combined facility on a single site. The siting requirements for the AECC/ESL are described in table 4.1 below. The MEEG has slightly less stringent siting requirements. These are also described in table 4.1.

Table 4.1 Summary of location requirements for Off-Site Power Station facilities

Off-Site Power Station facility	Location requirements
AECC/ESL	• Located within a zone that is more than 1.5km from the Power Station but less than 5km • Not downwind of the Power Station when taking into account the prevailing wind direction • Located at a point immediately adjacent to the road network in order to provide ease of access and, if required, access to off-road routes • Located in a zone of low seismic activity
MEEG	• Located more than 1.5km from the Power Station • Located on the island of Anglesey • Located at a point immediately adjacent to the road network in order to provide ease of access and, if required, access to off-road routes • Located in a zone of low seismic activity

A site selection process was defined and implemented in two stages. In the first stage, an initial list of sites was refined using a set of 'broad area of search' criteria and then further refined by applying location and wind direction criteria to create a shortlist of sites for each facility.

In order to identify sites for the initial list, the following data sources, provided by the Anglesey and Gwynedd Joint Planning Policy Unit, were utilised:

- sites contained within the Candidate Sites Register for the JLDP;
- sites with extant planning permission that have not yet been developed;
- sites known to the Joint Planning Policy Unit which have been presented by landowners for development subsequent to the closing date for inclusion in the Candidate Sites Register; and
- further sites identified by Horizon through discussion with local land agents.

The broad area of search criteria applied to the initial list of selected sites screened for those which:

- are located on Anglesey; and
- are not within areas designated as SAC, SPA, Ramsar sites, Sites of Special Scientific Interest (SSSI), World Heritage Site and Flood Risk Zone C2.

In the second stage, shortlisted sites were evaluated for suitability against the particular requirements of each development and planning policy. This evaluation resulted in the selected site(s) for each facility as described in section 3.8.

5 Consultation

5.1 Stage One Pre-Application Consultation

The Planning Act 2008 requires the promoter of an NSIP to undertake pre-application consultation (PAC) before making an application for a DCO. For complex proposals, it is not unusual for PAC to be undertaken in more than one stage.

Horizon completed its first stage of formal pre-application consultation (Stage One pre-application consultation (PAC1)) in December 2014. The aim of PAC1 was to provide clear information to allow the development of an open and on-going dialogue with Horizon's key stakeholders and the community, addressing the requirements of section 47 of the Planning Act 2008[3].

Four documents were prepared to provide a variety of levels of technical information and together formed the PAC1 consultation materials. A Consultation Overview Document and a PEI Non-technical Summary comprised the non-technical documents. The Consultation Document and PEI Report comprised the technical documents.

The Consultation Document presented Horizon's Wylfa Newydd Project proposals and highlighted particular areas where feedback from consultees would influence the development of the emerging proposals and the next steps Horizon planned to complete.

The PEI Report set out the environmental information collated in relation to the Wylfa Newydd Project proposals in advance of PAC1 as part of the EIA process. The PEI Report described the existing baseline environmental conditions and provided a preliminary indication of likely effects that could arise from the Wylfa Newydd Project. The purpose of this report was to provide sufficient PEI to enable members of the public, statutory consultees and other stakeholders to develop an informed view of the Wylfa Newydd Project.

The materials for PAC1 were prepared in accordance with statutory requirements and guidance and built on Horizon's previous engagement activities.

Horizon also consulted key stakeholders on scoping reports for three supporting assessments intended to be produced to accompany the application for the DCO. These were:

- Language Impact Assessment Scoping Report which set out Horizon's proposed method for assessing the potential effects of the Wylfa Newydd Project on the Welsh language and culture;
- Health Impact Assessment Scoping Report which set out Horizon's proposed method for considering the potential effects of the Wylfa Newydd Project on health and wellbeing; and
- Sustainability Assessment Scoping Report which provided the technical background for defining sustainability for the Wylfa Newydd Project expressed through the development of bespoke sustainability objectives.

[3] Section 47, The Planning Act 2008- Duty to consult local community

Since the close of PAC1 in December 2014, Horizon has continued to consult and engage with both statutory and non-statutory bodies such that the feedback from PAC1 has informed the development of the Wylfa Newydd Project. The results of this analysis are contained in Horizon's Consultation Feedback Report, which are available on Horizon's website.

5.2 Interim consultation

Horizon's next phase of community consultation was carried out in January 2016, with a series of events taking place through early spring. This consultation continued the progress made by Horizon since its first stage of major consultation in 2014 and provided another opportunity for people to view its latest plans and provide feedback on its proposals.

The public information events were followed by a series of focus group-style meetings on areas of the Wylfa Newydd project which are known to be a priority for local people, including the Welsh language and plans for worker accommodation.

5.3 Stage Two Pre-Application Consultation

The precise timing of the second stage (Stage Two pre-application consultation (PAC2)) will be largely dependent upon the issues which arise from our ongoing engagement activity, however it will take place in the second half of 2016. As with PAC1, the consultation will be widely advertised across Anglesey as well as on Horizon's website in accordance with the Statement of Community Consultation[4] (SOCC) and to satisfy the requirements of the Planning Act 2008. While PAC1 was focussed on section 47 consultees, PAC2 will fulfil the statutory consultation requirements of the Planning Act 2008 in respect of both section 42 and section 47 consultees. Section 42 of the Planning Act 2008 requires an applicant to identify and consult statutory consultees as required.

The materials will be prepared in accordance with statutory requirements and guidance. The content will build on Horizon's previous engagement activities, particularly PAC1, and explain the way in which the Wylfa Newydd Project has evolved, the environmental implications, and the reasons for the changes.

The PAC2 materials are likely to comprise non-technical and technical documents, as well as online technical resources on specific specialist topics. One of the technical documents will be a second PEI Report. This PEI Report will present the updated environmental information and the likely effects and predicted effects that could arise from the Wylfa Newydd Project. It will also include potential and provisional mitigation proposals. The PEI Report will be a pre-cursor to the various environmental statements that will need to be prepared to support the various planning and licensing applications, and ultimately the Wylfa Newydd Generating Station Environmental Statement that will accompany Horizon's application for a DCO.

[4] Horizon prepared its SOCC in conjunction with IACC in September 2014.As we the timing of the consultations have been revised, the SOCC has been updated and republished in January 2016. It is available on the Horizon website – www.horizonnuclearpower.com

5.4 Other Consultation and Engagement

For several years, Horizon has been engaging with key statutory bodies (including those with regulatory functions), as well as with the local community to raise awareness of the Wylfa Newydd Project and to keep residents across Anglesey and beyond informed of its plans. This also allows Horizon to understand and address issues and concerns raised by the statutory bodies and members of the public. This two-way engagement will continue throughout the development process and into construction and operation of the Wylfa Newydd Project in accordance with Horizon's SOCC

Horizon has undertaken consultation with both statutory and non-statutory entities since the close of PAC1. This has included meetings with statutory bodies to brief them on the results of the PAC1, the progress of the Wylfa Newydd Project, as well as Horizon's high level thinking of the proposals going forward. Engagement has also been undertaken with members of the public and residents across Anglesey.

Horizon will continue to meet stakeholders and communities in addition to the statutory consultation process. This is likely to involve continuation of the drop-in surgeries, exhibitions and newsletters. Horizon held five informal information events with local residents and stakeholders in July 2015 to provide the current detailed thinking on road improvement proposals and high-level thinking for the location of Associated Development (worker accommodation, logistics centres, and park and ride facilities).

Further targeted consultation activities to address the Site Preparation and Clearance works required at the Wylfa Newydd Power Station Site are anticipated in winter 2015/2016. As more information becomes available, Horizon will work to ensure that the details are relayed to statutory and non-statutory bodies alike.

5.5 Scoping Report

As part of the formal scoping process, PINS will administer consultation with a number of statutory bodies to obtain their comments on the content of this Scoping Report and provide Horizon with a summary of key issues and recommendations arising from the scoping process in the form of a Scoping Opinion. Horizon will also issue a copy of this Scoping Report to a number of statutory and non-statutory consultees for wider review and comment.

6 Scoping

6.1 Background

In accordance with Regulation 8 of the Infrastructure EIA Regulations, Horizon requested a formal opinion in November 2009 on the information to be provided in the Environmental Statement (in the form of a Scoping Opinion request). Horizon's request for a Scoping Opinion was accompanied by an EIA Scoping Report, which provided a high level description of a new nuclear power station at the Wylfa NPS Site and identified key potential effects of the Generating Station for each EIA topic area during the construction and operation phases. The EIA Scoping Report also set out preliminary proposals for mitigating these likely effects. The Scoping Opinion was issued in April 2010.

The original Scoping Report submitted to the IPC and the Scoping Opinion received in April 2010 can be accessed on the National Infrastructure Planning website at

http://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/?ipcsection=docs

The advice contained within the Scoping Opinion and Horizon's responses are included in Appendix C. Generally, the Scoping Opinion approved of Horizon's focus on certain EIA topic areas, whilst advising that greater emphasis should be placed in the Environmental Statement on the interrelationship between EIA topic areas.

The Scoping Opinion also advised that a number of additional studies and assessments should be carried out; in particular, a Health Impact Assessment (HIA) and a Language Impact Assessment (LIA).

6.2 Scoping Process

There is no prescribed approach to the process of scoping of issues for an EIA. There are a number of sources of detailed guidance for scoping from academic and Government sources for example, the EA has produced a 'best practice' handbook- 'A handbook for scoping projects, 2012'.

The intention of the scoping process is to identify significant issues for assessment. Such issues derive from the potential for the proposed development to lead to significant impacts on environmental receptors. To be significant, the likely changes must be more than negligible, the receptor must be of greater than negligible value or importance, and there must be a pathway between development and receptor.

The EIA team responsible for the DCO EIA has been involved in compiling this scoping report. This report is being produced as an update when progress has already been made with many of the baseline surveys. Considering the significant effects of the Project, there is considerable certainty behind the scoping process. The production of this scoping report has thus been guided not only by good practice and guidance materials, but also:

- on-going desk top studies and site surveys;
- review of relevant websites and published information;
- information in the Existing Power Station decommissioning EIA;

- the NSIP SSA nomination submission;
- the previous scoping opinion provided by the Planning Inspectorate;
- experience of other large infrastructure projects;
- feedback from Stage One pre-application consultation;
- other discussions with key statutory bodies (consultees); and
- other meetings with the community and other key stakeholders.

6.2.1 Approach to assessing effects on different aspects of the Environment

Part 5 of NPS EN-1 and sections 3.7-3.12 of NPS EN-6 Volume 1 identify potential environmental effects that can be caused by the construction, operation and decommissioning of new nuclear power stations. Table 6.1 lists the relevant chapters in this EIA Scoping Report which addresses the potential effects.

Table 6.1: Types of effects that are identified in EN-1 and EN-6

Potential effects listed in EN-1 and EN-6	Relevant technical chapters in this EIA Scoping Report
Air Quality and emissions	Chapter 8 Air Quality and Chapter 12 Radiological Effects
Biodiversity and geological conservation	Chapter 11 Terrestrial and Freshwater Ecology; Chapter 13 Soils and Geology ; Chapter 16 The Marine environment
Coastal change	Chapter 15 Coastal Processes and Geomorphology
Dust, odour, artificial light, smoke and steam and insect infestation	Chapter 8 Air Quality; Chapter 12 Radiological Effects and Chapter 10 Landscape and Visual
Flood risk	Chapter 14 Surface Water and Groundwater and the Chapter 15 Coastal Processes and Geomorphology
Historic environment	Chapter 17 Archaeology and Cultural Heritage
Landscape and Visual	Chapter 10 Landscape and Visual
Land use including open space, green infrastructure and Green belt	Chapter 10 Landscape and Visual and Chapter 19 Public Access and Recreation;
Noise and vibration	Chapter 9 Noise and vibration
Socio-economic	Chapter 18 Socio-economics
Traffic and transport	Chapter 20 Traffic and Transport

Potential effects listed in EN-1 and EN-6	Relevant technical chapters in this EIA Scoping Report
Water quality and resources	Chapter 14 Surface Water and Groundwater and Chapter 15 Coastal Process and Geomorphology
Waste management	This will be addressed in the scheme description section of the Environmental Statement and the environmental effects will be addressed in relevant chapters of the Environmental Statement.
Human health and wellbeing	Chapter 8 Air Quality, Chapter 9 Noise and Vibration, Chapter 12 Radiological Effects and Chapter 18 Socio-economics A separate Health Impact Assessment will be carried out and the HIA Report will accompany the DCO application alongside the Environmental Statement.
Safety and Security	These are not environmental issues and hence not addressed in this EIA Scoping Report.

NPS EN-6 provides an overview of the main findings from the Nuclear AoS and draws on its findings to highlight matters that will require further consideration through an assessment at the site-specific level. For the Wylfa NPS Site, specific considerations referenced include the following:

- The potential for adverse effects at Cemlyn Bay SAC; Ynys Feurig, Cemlyn Bay and The Skerries SPA; Menai Strait and Conwy Bay SAC; Liverpool Bay SPA; Lavan Sands SPA; and Puffin Island SPA;
- The potential for significant effects at the following SSSIs within 5km of the Wylfa NPS Site: Tre'r Gof SSSI; Cemlyn Bay SSSI; and Cae Gwyn SSSI;
- Assessment of areas of amenity, cultural heritage and landscape value, particularly – the Anglesey AONB; North Anglesey Heritage Coast; Cestyll Gardens Park and Garden of Special Historic Interest in Wales; Grade II listed buildings in Cafnan; and listed buildings in Cemaes;
- Potential radiation risks to health and wellbeing; and
- Potential effects of the influx of workforce on language, culture and welfare.

6.3 Topics Scoped out

Following a Review of the Wylfa Newydd Project, and in the case of civil and military aviation and defence interests, a discussion with the UK Civil Aviation Authority (UKCAA), scoping

concluded that the following environmental issues can be effectively scoped out of the Wylfa Newydd Project EIA.

6.3.1 Ozone

Ozone (O_3) is not emitted directly from any man-made source in any significant quantities but is formed by chemical reactions between other air pollutants in the atmosphere initiated by sunlight, such as NOx and volatile organic compounds (such air pollutants being "O_3 precursors"). The chemical reactions do not take place instantaneously, but can take hours or days, therefore ozone measured at a particular location may have arisen from volatile organic compounds and NOx emissions many hundreds or even thousands of miles away. Ozone measurements are carried out by the Department for Food, Environment and Rural Affairs (Defra) in North Wales at Aston Hill[5] and are considered to be Low. Due to the long-lived nature and long-range transport capabilities of O_3, it is therefore, difficult to attempt to assess and control the concentrations of O_3 in the air at a local scale. Controls are therefore exerted at a National and European level and, for these reasons, it is standard practice to 'scope out' assessment of regional ozone effects from EIAs.

6.3.2 Odour

It is considered that there should be no significant sources of odour associated with the Wylfa Newyyd Project and that odour can be scoped out of the EIA.

However, this will be kept under review, in the event that potential odour sources are identified as more details emerge about the activities to be carried out for the Wylfa Newydd Project.

6.3.3 Insect infestation

An assessment of the site-specific external hazards is required for the development of a site-specific Pre-Construction Safety Report for the Wylfa Newydd Project .Insect Infestation was considered as part of this assessment and thus has been scoped of the EIA.

6.3.4 Accidental Radiological Releases

As part of the Nuclear Safety Case, Horizon will assess scenarios involving unplanned releases of radioactivity. In addition to this, the Euratom Article 37 Submission for the Power Station Site will also contain an assessment of accident scenarios to both the local area and affected European Union Member States. It is thus proposed to scope out the environmental impacts of unplanned releases from the Environmental Statement (see section12.3 for further details), which will only consider normal operation of the Generating Station in its scope.

In keeping with guidance and case law Horizon proposes to screen the environmental effects of low probability emergency situations out of its EIA work. The EIA Directive and Regulations require 'likely' significant effects to be considered and unlikely events therefore fall outside of the scope of EIA. Such an approach is supported by NPS EN-6, which considers that such rare events can be appropriately regulated and mitigated through other regulatory mechanisms managed by the ONR. Paragraph 2.7.3 of the NPS states that when considering a DCO

[5] Air Quality in Wales, http://www.welshairquality.co.uk/index.php, Last accessed pm 13th August 2015

application, the IPC (now the Secretary of State) should assume that the relevant licensing and permitting regimes will be properly applied and enforced. This position was considered in some detail, and confirmed by the Court of Appeal in the An Taisce[6] case.

The EIA Directive requires transboundary consultation to take place where a Member State is aware that a project is "*likely to have significant effects on the environment in another Member State*". Horizon will consider the potential for such transboundary effects in as part of its environmental impact assessment although it is considered that such effects are unlikely to arise.

6.3.5 Seismic Risk

Seismic risk will be considered as part of the GDA and the Nuclear Site Licence Application which requires all safety systems designed in such a way as to account for conceivable internal and external hazards, including seismic risks. These are not within the scope and hence will not be addressed in the EIA.

6.3.6 Civil and military aviation and defence interests

The NPS EN-6 identifies civil and military aviation and defence interests one of the 'Flags for Local Consideration', described as siting criteria that were identified through the SSA consultation in 2008, but which were considered would be more appropriately assessed at the project level. As part of the SSA, all nominated sites (including the Wylfa NPS Site) were assessed in relation to their proximity to civil and military aircraft movement and were found to be potentially suitable.

The Existing Power Station has an associated Restricted Area. As part of the consultation carried out as part of the SSA, Civil Aviation Authority (CAA) advised that a Restricted Area around the site (or an amendment to the existing Restricted Area)[7] could provide a similar level of protection from civil aircraft movements. Thus it is considered this is not a relevant concern for the Wylfa Newydd Project EIA, and this topic was subsequently scoped out.

[6] An Taisce (The National Trust for Ireland), R (on the Application of) v The Secretary of State for Energy and Climate Change & Anor [2014] EWCA Civ 1111).

[7] Section C.9.44, Annex C, National Policy Statement for Nuclear Power Generation (EN-6)

7 Approach to Environmental Impact Assessment

7.1 EIA Regulatory Context

The Environmental Impact Assessment Directive (2014/52/EU) (the EIA Directive) forms the basis for the legal requirements for EIA and of EIA practice in the UK and is implemented through separate statutory instruments specific to different consenting regimes and jurisdictions.

The European Directive has been incorporated into English and Welsh planning law through a series of EIA Regulations. Of particular relevance to the development of a nuclear power station are the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended), which require the carrying out of an EIA in relation to applications for development consent for an NSIP.

7.2 Environmental Impact Assessment Methodology

7.2.1 Introduction

This chapter sets out the proposed approach to undertaking the EIA that will inform the Environmental Statement to be submitted as part of the Wylfa Newydd DCO application.

The assessment of the likely environmental effects of the Wylfa Newydd Project will be undertaken and reported in accordance with legislative requirements set out in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) using a combination of established standards, best practice guidance and professional judgement.

Broadly, the EIA process can be described as *"the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made*" (International Association for Impact Assessment (IAIA), 2009). In the UK this typically involves a number of steps underpinned by stakeholder consultation:

- Screening
- Scoping
- Environmental Assessment
- Reporting
- Decision Making.

7.2.2 Screening and Scoping

At the time of writing this Scoping Report, the EIA of the Wylfa Newydd Project is advanced but on-going. Screening is complete, and preliminary scoping has been agreed: the intention of this Scoping Report is to update the outcome of the previous scoping exercise to ensure that all material changes to the Project and regulatory environment are taken into account in the EIA.

7.2.3 Environmental Assessment

The process of environmental assessment involves the following stages and activities:

- Defining the baseline conditions, achieved through a combination of desk based studies, site visits, detailed surveys and consultation.
- Impact prediction and evaluation, across different phases and stages of a development's life-cycle.
- Identifying measures to mitigate adverse environmental impacts, by way of optioneering, iterative design changes, or management plans.
- Identification and evaluation of the residual effects that may persist, post-establishment of mitigation.
- Reporting the findings of the EIA process in the Environmental Statement.

While there is a chronological sequence to these steps, EIA is an iterative process that should incorporate a series of feedback loops (See figure 7.1). Information from any stage of the assessment can inform a previous stage and loop the process back for reassessment.

As described below, the Wylfa Newydd Project EIA requires assessment across a multi-disciplinary suite of environmental topic areas. Each has particular impact assessment guidance and methodologies relevant to the discipline. The approaches that are proposed to be taken are summarised in the topic chapters of this Scoping Report.

Baseline studies

The establishment of the baseline for the Wylfa Newydd Project includes determining the present state of the environment and also the likely future state if the Project was not to go ahead. Due to the lapse of time between the EIA and the construction and eventual operation of the project, the future baseline accounts for inherent changes due to natural trends or other non-related human activities (such as other planned developments not related to the Wylfa Newydd Project). In some aspects it is not possible to extrapolate from a dataset or data does not exist, in which case expert professional judgement is used to describe a future baseline.

The methods applied to gather baseline information vary between environmental topics, and are specified in the individual topic chapters 8 to 20. However, in general terms the range of methods applied includes:

- data-gathering from maps, other printed and web-based sources;
- reviews of other environmental reports;
- examination of historical records, old maps, aerial photographs and other primary sources of information;
- data requests to environmental and other organisations that hold databases of relevant information;
- site visits and surveys; and,
- computer-based modelling and calculations.

For each topic, it is essential to establish an appropriate study area that reflects the area over which relevant effects may potentially be felt. For some topics, this may be limited to the immediate area of development itself. For some other topics, the potential effects of development related activities may extend well beyond the actual development site, so the study area will be significantly larger. The extent of and reasons for the survey area for each topic is outlined in each of the specialist topic chapters.

Impact prediction and evaluation

Impact evaluation is a central tenet of the EIA process. It is the process of bringing together the project characteristics with the baseline environmental characteristics and ensuring all potentially significant environmental effects (adverse or beneficial) that result from this interaction are identified and assessed.

Effects of the Wylfa Newydd Project will be assessed across the phases of:

- construction
- operation and;
- decommissioning.

The construction phase includes the site preparation and clearance works as well as the main civil engineering works to build the Generating Station.

The operational phase constitutes the commissioning and subsequent activities associated with electricity production and the maintenance of the Generating Station.

Ahead of decommissioning it is anticipated that Horizon will need to undertake a further EIA process under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (as amended). This would assess the baseline conditions at that time and consider the technologies of that time to be used in decommissioning when conducting that EIA. Given the length of time until the decommissioning phase it is recognised that there is some inherent uncertainty regarding the prediction of impacts. Therefore, the assessment of the decommissioning phase in this Environmental Statement will be more qualitative by nature.

To assess each of the phases, activities are identified from which predicted effects on the environment are described. Secondly, receptors (features of interest in the baseline environment) are identified, along with their value and how they might be affected. Through consideration of the combination of the magnitude of change that the development might bring with the value of a receptor, an assessment can be made of the potential significance of the resulting environmental effect.

While the Regulations require a simple presentation of 'likely significant effects', the potential level of significance of each identified environmental effect will be rated within a range in order to provide a context and consistency across the findings of the EIA.

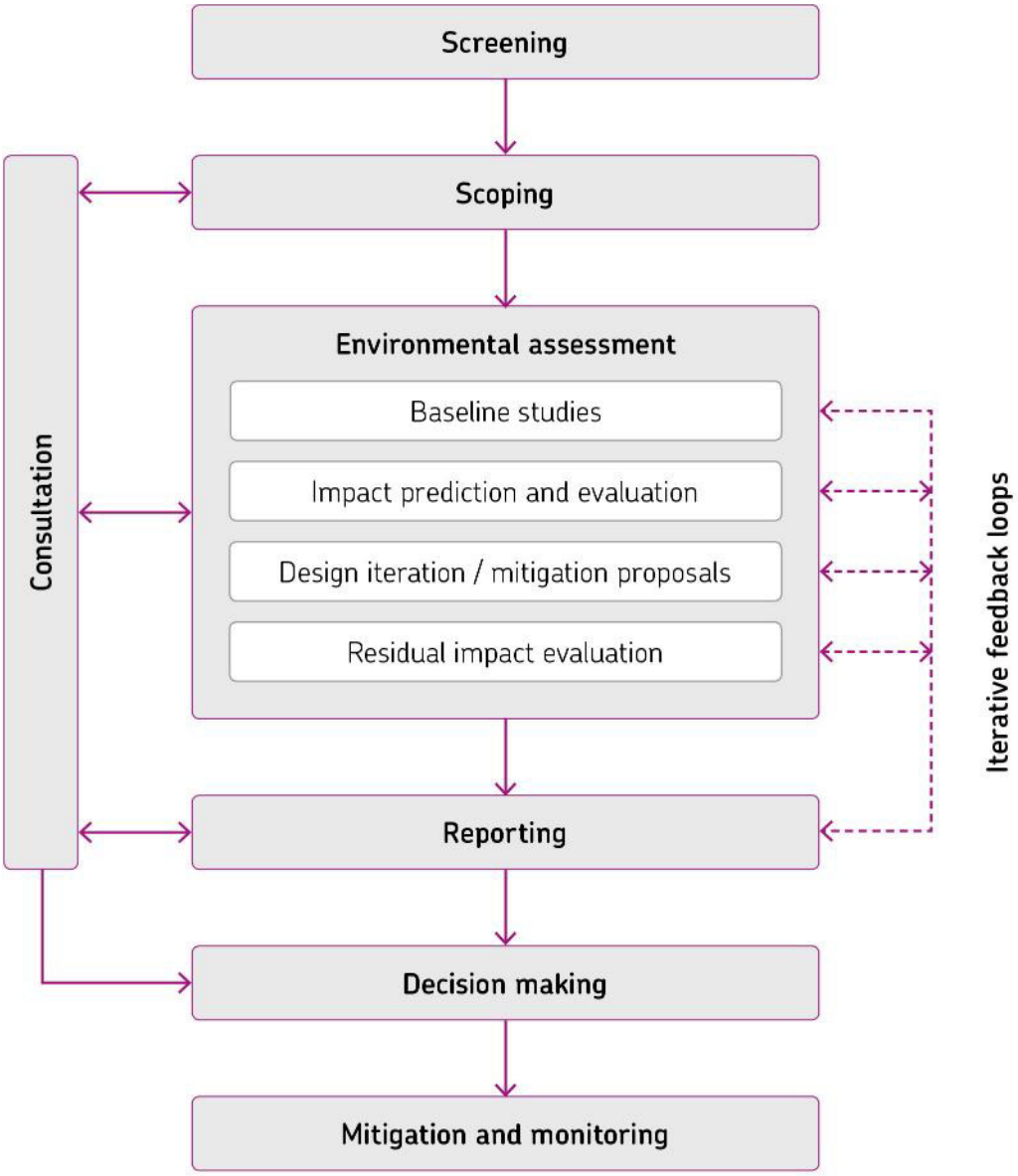
Rochdale Envelope

With such a complex development, it is inevitable that some detail will change between the initial design process, the appointment of contractors, and the final detailed design and construction process. In such circumstances, NPS EN-1 and Planning Inspectorate Advice Note 9 (PINS, 2012) recognise that using the '*Rochdale Envelope'* approach may be beneficial. (This principal arose from two cases that dealt with outline planning applications for a proposed business park in Rochdale under the Town and Country Planning Act 1990 regime). Advice Note Nine gives three key areas where the level of project detail and amount of flexibility are particularly relevant:

- *"during consultation and publicity at the pre-application stage;*
- *when preparing the environmental impact assessment; and*
- *in the description of the project within the application documents".*

Rochdale Envelope principle in effect allows maximum parameters of a project to be set where options remain in the design. The EIA for the DCO application will thus look at limits of deviation from expected parameters (such as building footprint and height, route of infrastructure links, etc.) and assess the ‘reasonable worst case’ for each environmental topic, ensuring that the environmental statement sets out the upper end level and significance of effect, no matter where within the limits of deviation the development eventually sits.

Figure 7.1 The EIA Process



EIA significance criteria

The Infrastructure EIA Regulations require that an EIA describes the likely significant effects of a project on the environment, but they do not provide a specific definition of 'significance'.

Horizon's process of identifying the significance of predicted environmental effects has been developed to standardise the approach across the various aspects of the Wylfa Newydd Project subject to EIA. The only exception to this is the A5025 improvement EIA which will use adaptations of generic significance criteria typical of a road improvement scheme.

Although professional judgement is the principal factor in determining which effects would be significant, the EIA topic specialists would be guided by the methodology outlined here, in order to ensure consistency between topics.

Taking an overview of the Wylfa Newydd Project, an environmental effect will be considered significant if it would meet at least one of the following:

- Be sufficient for the consenting authority to reasonably consider it to be a reason for refusal, or for applying a planning condition / requirement or legal agreement to the consent to reduce or overcome the effect.
- Lead to an exceedance of defined guidelines or widely recognised levels of acceptable change (these could be different for the various topics within the EIA and are described in individual topic chapters).
- Threaten or enhance the viability or integrity of a receptor or receptor group of concern.
- It is likely to be material to the ultimate decision about whether or not the consent application should be approved.

For assessment, the significance of an environmental effect will be expressed as a function of the value of a receptor affected and the magnitude of the change that is experienced as a result of the development.

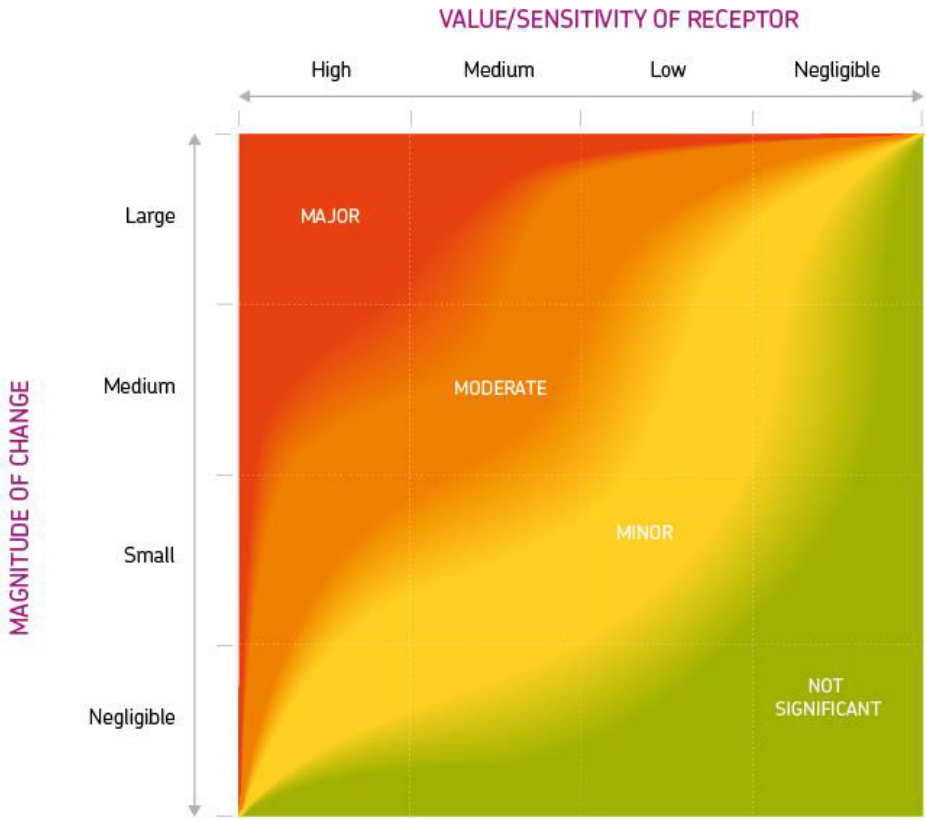
EIA is by its nature multi-disciplinary, and – within a common framework - each of the various topic specialists will assign values and magnitude of change that are bespoke to their respective assessment.

The baseline studies for each topic will enable the identification of a number of ‘receptors’ (i.e. features of environmental interest that might be potentially affected by an environmental impact). The information gathered during the baseline studies enables each receptor to be assigned a ‘value’ and a degree of ‘sensitivity’ to impact determined. The value or sensitivity of each receptor will be described as high, medium, low or negligible, in accordance with general criteria that will be detailed in the Environmental Statement.

The magnitude of change measures the scale or extent of the change from the baseline condition, irrespective of the value of the receptor(s) affected. In determining magnitude, the extent of the physical change is considered in the context of other factors such as existing long term trends. Some effects will change over time, and in such cases, the assessment will be made for different assessment years. The predicted magnitude of change will be described as large, medium, small or negligible.

The two parameters will be combined through expert judgement with the guidance of a common matrix to establish the level of significance of the effect. Common terms will be used to describe this – major, moderate, minor and not significant. The assessment of the degree of significance of an effect is determined through professional judgement, where necessary guided by the matrix shown in figure 7.2. The degree of significance is influenced by the value of a receptor and the magnitude of the predicted change.

Figure 7.2 Significance Ratings Matrix



Where appropriate, the definition of a likely significant effect will also describe if the effect is:

- indirect or secondary;
- describe whether it is permanent or temporary;
- reversible or irreversible;
- if it is positive or negative; and
- define if it is short, medium and long term, preferably through a numeric prediction of its duration (and whether that changes over time).

Design Iteration and Mitigation Proposals

Mitigation is the term used to describe measures used to prevent or reduce adverse environmental effects. The EIA process enables mitigation measures to be identified and then a commitment is made to implementing those measures, before the final assessment of significance of effects (known as residual effects) is completed. Where significant adverse effects are predicted, the identification of mitigation measures will follow a hierarchy as identified in the IEMA EIA Guidance of:

- avoidance;
- reduction;
- compensation;
- remediation; and
- enhancement.

The first preference in the mitigation hierarchy is to seek design measures that would entirely avoid or eliminate an adverse effect. The avoidance of an environmental impact by design would be inherent in the Project, and will be identified as such.

Where avoidance of an adverse effect is not possible, mitigation would be introduced to reduce the magnitude of change or to reduce the sensitivity of the receptor.

Compensation measures are not usually considered as true mitigation measures, but they may be used as a last resort to offset impacts that cannot be mitigated in other ways.

Some mitigation measures are so integral to the overall scheme design that they have already been incorporated within the current design. These are known as 'embedded' mitigation measures. These measures will be are described as part of the overall Project description.

Residual effect evaluation

Any environmental effects predicted to remain post-mitigation will be assessed using the same assessment criteria as the pre-mitigation effects. They are subsequently referred to as 'residual' effects.

When assessing the residual effects a precautionary approach will be taken when predicting the effectiveness of mitigation and the post-mitigation conditions.

If measures that are designed to mitigate an adverse impact also result in an environmental improvement compared to the baseline conditions, the residual effect may be recorded as 'beneficial'. Conversely, some mitigation measures that are designed to mitigate an adverse impact for one topic may result in an adverse impact for another topic area. Regardless of which topic is the source of the requirement for a mitigation measure, the consequential effects of such measures will be considered in the assessments for all relevant environmental topics as part of the iterative assessment process.

The residual effects of the Wylfa Newydd Project will ultimately be considered during the decision-making process by the Planning Inspectorate and the Secretary of State when weighing up the considerations of whether to grant DCO consent or not. Therefore, the assessment of the significance of the residual effects after mitigation will be a key outcome of the EIA process.

7.2.4 Reporting

The findings of the EIA will be reported in the Environmental Statement. The information that the Environmental Statement must contain is described in Schedule 4 of the EIA Regulations. The required information falls into the broad categories of:

- "*Description of the development, including in particular:*
  - *a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases;*
  - *a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;*
  - *an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development.*

- *An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects.*
- *A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.*
- *A description of the likely significant effects of the development on the environment, including direct and indirect effects, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:*
  - *the existence of the development;*
  - *the use of natural resources;*
  - *the emission of pollutants, the creation of nuisances and the elimination of waste,*
  - *and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment..*
- *A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.*
- *An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information".*

Owing to the scale, complexity and nature of the Wylfa Newydd Project, the Environmental Statement will be a detailed and very extensive document, made up of a number of volumes. In accordance with Schedule 4, a Non-Technical Summary will be provided that will make the findings of the EIA accessible to less technical readers.

The environmental topic areas that are being considered during the EIA and will be reported within the Environmental Statement, and accordingly presented in this Scoping Report, are:

- Air Quality
- Noise and Vibration
- Landscape and Visual
- Terrestrial and Freshwater Ecology
- Radiological Effects
- Soils and Geology
- Surface Water and Groundwater
- Coastal Processes and Coastal Geomorphology
- The Marine Environment
- Archaeology and Cultural Heritage.
- Socio-Economics
- Public Access and Recreation
- Traffic and Transport.

This list covers feedback from the original scoping exercise in 2009, and subsequent engagement with regulators. The final list will be subject to the outcome of this scoping exercise.

For consistency, each Environmental Statement topic chapter is likely to be similarly structured in accordance with the following headings:

- Introduction
- Guidance and consultation (topic specific guidance and consultation that has informed the assessment)
- Methodology (describing the study area, how the baseline has been characterised and impacts evaluated)
- Environmental baseline, including identification and valuation of receptors
- Assessment of effects during construction, operation and decommissioning
- Potential effects and mitigation
- Residual effects
- Cumulative impact assessment.
- References

The cumulative effects of the Associated Development required for the Wylfa Newydd Project will be assessed as well as other reasonably foreseeable developments.

7.2.5 Decision making

As a NSIP, the decision whether to grant development consent will be made by the Secretary of State following a recommendation from the Planning Inspectorate Examining Authority (a panel of Planning Inspectors).

7.2.6 Transboundary effects

Beyond consulting with the local community, statutory consultees and other relevant stakeholders, there are a number of legal requirements which require consultation across international borders within the European Economic Area (EEA).

The United Nations Economic Commission for Europe Convention on Environmental Impact Assessment in a Transboundary Context was adopted in 1991 in the Finnish city of Espoo and is known as the Espoo Convention. The Espoo Convention lays down the general obligation of EEA States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across national boundaries.

Nuclear power plants (listed in Appendix I to the Espoo Convention) automatically require application of the Espoo Convention if significant transboundary impact is likely. The Espoo Convention has been implemented by the EIA Directive and transposed into UK law by the EIA Regulations, specifically under regulation 24 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (Planning Inspectorate, 2012(a)).

The assessment of the potential for transboundary environmental effects will be presented in the DCO application and Horizon will work with the Planning Inspectorate to consult with relevant EEA States if appropriate.

If there is the potential for significant effects that might reach other EEA States, the Secretary of State (via the Planning Inspectorate) would notify relevant EEA States inviting them to be part of the process, and consult with those that request to be included once the DCO application has been submitted.

From the preliminary assessments the Project has the potential to give rise to significant transboundary effects in respect of the following countries and receptors.

- ornithology (Republic of Ireland); and
- marine mammals (Republic of Ireland).

The potential for transboundary effects is also determined through Habitats Regulations Assessments (HRA) that will accompany the various consenting applications.

7.2.7 EIA modular Approach

To ensure compliance with Infrastructure EIA Regulations, the overall environmental effects of the Project need to be assessed as a whole. The individual elements of the Project, which will be subject to different applications, need to be assessed collectively so that the overall environmental effects of the Project can be understood.

The Project programme requires some of the associated developments to be consented prior to the submission of the DCO application. To ensure cohesion, a modular EIA approach is being undertaken.

The environmental statement supporting the first TCPA application will contain a C IA. It will follow the approach described in Chapter 21 and report the cumulative effects of the Project as understood at that time.

As the Project programme advances, environmental statements supporting subsequent consent applications will contain a CIA which will build on each previous assessment and present the current understanding of the cumulative effects of the Project.

Ultimately, the Environmental Statement for the DCO application will include a comprehensive CIA of all development brought forward as part of the Wylfa Newydd Project.

Each environmental statement produced to support a consent application in advance of the DCO application will define its relationship to the Wylfa Newydd Project. It will explain the context of the proposed new nuclear generating station and whether the activities reported in that environmental statement form an essential enabling activity or mitigation of the overarching Wylfa Newydd Project.

7.3 Other Impact Assessments

7.3.1 Health Impact Assessment

A Health Impact Assessment (HIA) considers the potential health effects associated with policies, plans or projects. While not a statutory requirement, Horizon has responded to the 2009 Scoping opinion, consultation requests and is carrying out an HIA.

The HIA will identify the:

- potentially positive and negative significant health and wellbeing effects of the development of the Project;
- opportunities for improving health and wellbeing and reducing health inequalities; and
- mitigation opportunities.

The HIA screening and scoping stages have taken place, and the assessment is well underway with the HIA study area and baseline characteristics have been identified. A separate scoping report was issued to ensure that the assessment concentrates on those issues that are most important for the health and wellbeing of people living, visiting and working on Anglesey, and where appropriate, in North Wales.

An HIA Interim Report will be submitted as a standalone document within the Stage 2 Pre-Application Consultation suite of documents and should be referred to for greater detail on the Wylfa Newydd HIA. A final HIA Report will accompany the DCO application alongside the Environmental Statement.

7.3.2 Welsh Language Impact Assessment

Welsh language is a key planning consideration in Wales and in response to the 2009 scoping Opinion and consultation responses Horizon is conducting a Welsh Language Impact Assessment (WLIA) to consider the potential effects the Wylfa Newydd Project could have on Welsh language and culture. Horizon understands the importance that the integrity of the Welsh language has in Wales. It has been a commitment throughout the development of the Project to have the Welsh language as a 'golden thread' that runs throughout the application and subsequently into the construction, operational and decommissioning phases of the Project.

The study area for the WLIA will be complimented by, and use the same geographical and spatial areas as, those set out for the socio-economic assessment. This is considered to be the area in which a local workforce would be expected to reside.

To perform the assessment, a wide range of evidence is being gathered, including:

- Census and other background data to identify the proportion and demographics of the population that speak Welsh, trends in that proportion.
- Local strategies and initiatives including education provision.
- Evidence of Welsh being used in the workplace.
- Community facilities that use Welsh such as activities and societies, media outlets, recreational facilities.
- Projections for migration patterns.

Once the baseline has been identified, the assessment will start with consideration of whether the language is an issue of equal significance across the study area, or whether it would be more appropriate to target efforts to specific areas within the study area.

The WLIA will assess the likely impact of the Project against five key aspects of community life with a view to establishing both its effects on the community in general and its impact on the Welsh language more specifically. The five key aspects of community life are:

- population characteristics;
- quality of life;
- economic factors;
- infrastructure supply; and
- social and cultural aspects.

Consultation commenced in 2015 and will continue into 2016 with specific stakeholders and through a WLIA Steering Group. A WLIA Interim Report will be issued as part of the Stage 2 Pre-Application Consultation and will contain a full update on progress to date and further detail on the way ahead.

7.3.3 Habitats Regulations Assessment

The Habitats Directive (European Council Directive 92/43/EEC) on the conservation of natural habitats and of wild fauna and flora required the establishment of a network of protected wildlife areas in EU member states, known as the Natura 2000 network.

The Habitats Directive stipulates that *"…any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*".

These requirements are transposed into English and Welsh legislation through the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'), as amended. The Regulations place a responsibility on the competent authority (the Secretary of State in the case of the DCO application) to make an appropriate assessment of the implications for a Natura 2000 site in view of that sites conservation objectives before deciding to undertake, or give consent, permission or other authorisation for, a plan or project which:

- is likely to have a significant effect on a European site or a European offshore marine site (either alone or in-combination with other plans or projects), and
- is not directly connected with the management of that site.

The process is known as a HRA. Although they are two distinct assessment processes, with separate legislative drivers, there are in particular three main overlaps between them:

- HRAs can draw upon a number of the EIA topics to provide information required in predicting any likely significant effects on the Natura 2000 network.
- The outcomes of an HRA process that describes any potentially significant effects on Natura 2000 sites would be used within the EIA Terrestrial and Freshwater Ecology and Marine Environment topic assessments.
- Mitigation and avoidance proposals arising from any likely effects identified through the HRA process would be developed in a coherent and collaborative manner with those arising through the EIA process.

Horizon will provide the necessary information and analysis for the competent authority to undertake the HRA in tandem with EIA. For the Wylfa Newydd Project, the complex consenting process over an extended period of time necessitates a modular approach to HRA, where each specific Project element is screened in turn and eventually will contribute towards a single DCO HRA. The potential cumulative and in-combination effects of each specific Project element will also be considered in this process.

HRA Screening assessments for most aspects of the Project are currently being prepared. Consultation is already underway with the local authority, NRW and others, and this will continue alongside the EIA process.

8 Air Quality

8.1 Introduction

This chapter provides an assessment of the potential air quality effects associated with the proposed activities within the Wylfa Newydd Development Area (Proposed Activities). Consideration of air quality effects includes air pollution that could potentially affect health (such as emission of air pollutants from car exhausts) and dust, which could give rise to annoyance due to the soiling of surfaces through deposition. Both air pollution and dust could also affect sensitive plants and ecosystems. This chapter considers potential non-radiological air quality effects only. Radioactive discharges to the atmosphere are discussed in Chapter 12.

8.2 Existing Environment

8.2.1 Receptors

The air quality assessment will consider the following types of sensitive receptors:

- human receptors such residential properties, schools, hospitals, care homes, recreational areas, and footpaths; and
- ecological receptors are habitats and ecosystems which are sensitive to air pollution or dust deposition. These include SACs and SPAs which are protected at a European level, SSSIs, National Nature Reserve (NNR) and Local Nature Reserve (LNR), which are generally protected by national legislation, and non-statutory sites such as local wildlife sites and ancient woodland.

8.2.2 Baseline conditions

The Wylfa Newydd Project is located within the jurisdiction of IACC. As part of the Local Air Quality Management (LAQM) process, IACC undertakes an annual review of air quality in its area, to determine whether the Air Quality Objectives (AQOs) for a number of key air pollutants will be achieved. This review is undertaken on an on-going basis, and is reported annually to Defra and the Devolved Administration.

The main pollutants associated with the Proposed Activities with regard to human health are nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2) and fine particulates (referred to as PM_{10} and $PM_{2.5}$).

As part of this review process, IACC has undertaken measurements of a number of pollutants in recent years, including NO_2, PM_{10}, $PM_{2.5}$ and SO_2. Air quality is measured in relation to the concentrations of certain pollutants in the air, taking account of the effects of pollution on human health and ecosystems. Air quality on Anglesey is considered to be good. The 2014 IACC Air Quality Progress Report (IACC, 2014) concluded that currently there is no risk of the AQOs being exceeded for PM_{10} and SO_2 on Anglesey. It identified one location where the NO_2 annual mean AQO was not met, based on measurements at a kerbside site adjacent to a layby on the A55 (T) at Llanfair PG. However, there is no nearby relevant exposure locations at this site and the nearest residential property to the A55 (T) is approximately 20m from the kerbside. IACC concluded that concentrations of NO_2 at 20m from the kerbside would be much lower and well within the AQO.

The results of the PM_{10} and $PM_{2.5}$ monitoring at the Wylfa Newydd Development Area show that the measured concentrations are relatively low, and well within the AQOs.

In addition, IACC has undertaken measurements of some pollutants in the vicinity of the Wylfa Newydd Development Area and A5025, to help inform its response to the Wylfa Newydd DCO application. The results for 2013 showed that the measured concentrations were very low, and well within the AQO.

IACC also carried out measurements of dust deposition in 2012 and 2013 at locations within and near the Wylfa Newydd Development Area. The measured dust deposition rates were within the typical deposition rates normally quoted for a rural area and are well below the levels of dust deposition which could possibly affect amenity and give rise to complaints, generally around 200 mg/m^2/day. The dust deposition data will be used to inform any future monitoring and dust mitigation associated with the site preparation and clearance works.

Defra and the Devolved Administrations provide empirically-derived background maps, which give estimates of background pollutant concentrations on a one kilometre square grid resolution across the UK. The data for Anglesey were reviewed, and show that the background map concentrations are all very low at most locations across Anglesey and in the vicinity of the Wylfa Newydd Development Area. The background maps were found to be useful for determining the background concentrations of some of the pollutants for use in the air quality assessment.

A more detailed description of the baseline conditions and how the background concentrations have been selected for use in the air quality assessment will be provided in a separate report [Baseline Data Synopsis Report – Air Quality, Horizon report reference WN03.03.01-S5-PAC-REP-00017] which will be issued alongside the DCO Pre-Application Consultation documentation.

The main pollutants associated with the Proposed Activities with regard to effects on ecological receptors are oxides of nitrogen (NOx), SO_2 and the resulting deposition of nitrogen and acid. Information on the concentrations of NOx and SO_2 at the ecological receptors will be obtained from the Defra background mapping. The existing deposition rates of nitrogen and acid are available on the Air Pollution Information System website and these would be used to specify the existing deposition rates for the air quality assessment. Further information on the existing deposition is provided in a separate report [Baseline Data Synopsis Report – Air Quality, Horizon report reference WN03.03.01-S5-PAC-REP-00017].

8.3 Potential Effects and Mitigation

The potential air quality and dust effects associated with the Proposed Activities during the construction, operation and decommissioning phases are:

- Emissions of air pollutants and dust during the preparation and clearance of the Wylfa Newydd Development Area prior to construction of the Power Station commencing. This includes emissions to air from plant or machinery, primarily non-road mobile machinery, or dust emissions generated by activities such as earthworks or vehicle movements on dusty surfaces.
- Emissions of air pollutants and dust during the construction of the Generating Station, and the Off-site facilities including the associated earthworks and creation of the landscape proposals (the LEMP). This includes emissions from similar sources as

described above and will also include emissions associated with the construction and operation of the MOLF.

- Emissions of air pollutants during operation (including commissioning) of the Generating Station. This includes emissions from the combustion of fossil fuel in boilers and stand-by electrical generators.
- Emissions of air pollutants from road vehicles such as cars, vans, lorries and buses travelling on the road network associated with the Proposed Activities being undertaken on the Wylfa Newydd Development Area during the construction and operation of the Power Station and the Off-site Power Station facilities.
- Emissions of air pollutants and dust during decommissioning including emissions of air pollutants from road vehicles and marine vessels.

Subject to the outcome of the assessment work, mitigation measures would be employed as part of the construction phase of the project to minimise the risks of causing impacts. These will include standard best practice working methods for minimising dust emissions and would be incorporated into a suitable management plan such as a Dust Management Plan.

Other appropriate management plans for the nearby sensitive ecological sites (e.g. Tre'r Gof SSSI and Cae Gwyn SSSI) would be developed where required to mitigate potential impacts for increased dust deposits or air pollution on flora and fauna within these sensitive sites.

Other mitigation measures would be proposed as required to reduce the magnitude of any potential impacts, based on the outcome of the air quality assessment.

8.4 Proposed Scope, Methodology and Criteria

The specific methodologies that will be used to assess the different types of potential air quality effects are described in more detail in the 'Assessment Methodology' section below (Section 8.4.2).

The NPS EN-6 (DECC, 2011a) acknowledges that "*The operation of a new nuclear power station is unlikely to be associated with significant noise, vibration or air quality impacts*". However, it does note that greater impacts may occur from construction and transport activities, or if cooling towers (especially forced draught towers) are required. NPS EN-6 also states that *"With appropriate mitigation, the subsequent effect of these potential impacts on human health is unlikely to be significant".*

The NPS EN-1 (DECC, 2011b) recognises that the likely noise impacts will be determined by the characteristics of the *"…inherent operational noise" from the Power Station Site and the proximity of noise sensitive receptors (both human and ecological) (note that the definition of noise provided in NPS EN-1 includes vibration). NPS EN-1 also sets out the requirements of a noise assessment, including:*

- *a description of the noise sources, with particular attention to tonal, impulsive or low frequency characteristics, and to include ancillary activities such as increased road traffic movements;*
- *identification of noise sensitive premises and areas;*
- *characteristics of the existing noise environment;*

- *prediction of how the noise environment will change, including construction and operational period and at various times of the day. Reference should be made to relevant British Standards and other guidance;*
- *an assessment (using relevant British Standards and other guidance) of the effect of the predicted change in noise environment on the noise sensitive premises and areas. Predicted noise levels may also inform the ecological assessment, if required by Countryside Council for Wales (now part of Natural Resources Wales (NRW)); and*
- *mitigation measures including:*
    - *engineering – controlling noise and vibration emissions at their source (for example by using quiet machinery) and preventing noise from travelling (for example by building noise barriers);*
    - *lay-out – ensuring adequate distances between noise or vibration sources and sensitive receptors and locating other buildings where there are natural or man-made landscape features to screen the noisiest parts of the development;*
    - *administrative – limiting the types of activities allowed, or the times of day (or year) that certain operations are allowed, or specifying acceptable noise limits; and*
    - *sound insulation measures to dwellings – only to be applied once all other forms of mitigation have been exhausted.*

The noise assessment presented in support of the DCO application will include all of the elements identified above.

8.4.1 Study Area

As described previously in this chapter, there are a number of different types of potential air quality effects that require assessment, as well as different locations to consider. As a result, the air quality study area cannot be defined within a fixed boundary for all activities, but will necessarily vary between the different activities and phases. Three study areas have been identified for the following activities: dust emissions during construction, construction impacts, and operational impacts.

For dust emissions during the construction phase, the assessment will focus on areas extending up to 350m from the Wylfa Newydd Development Area and the off-site facilities proposed locations. This distance is based on guidance produced by the Institute of Air Quality Management (IAQM) for identifying when an assessment of dust effects is required. Potential effects at distances greater than 350m will be less and any mitigation measures applied to protect sensitive receptors within 350m will also help to reduce likely effects beyond 350m.

Air quality assessment of potential construction effects due to construction plant, machinery and marine vessels will focus on areas up to 2km from the Wylfa Newydd Development Area. This encompasses an area where the highest potential effects may occur due to emissions to air from relevant sources such as construction plant and machinery operating within the Wylfa Newydd Development Area. For Off-Site Power Station facilities, the scale of any plant used for construction will be considerably lower and no quantitative modelling of plant and machinery emissions is proposed.

The study area for air quality assessments from potential operational effects is defined by the H1 Environmental Risk Assessment guidance (produced by the EA / NRW, 2011). The detailed

modelling assessment will include a modelled area extending up to 6km by 6km square shaped grid centred on the operational combustion sources, and also include specific sensitive ecological receptors up to 15km from the combustion sources.

For the assessment of emissions from construction and operational road traffic, the full extent of the topic study area extends up to 200m from roads used by construction and operational traffic. This distance is set in the Design Manual for Roads and Bridges (DMRB) guidance for the assessment of both human receptors and other sensitive receptors. The actual roads to be included within the study area are yet to be determined, but will be defined by whether a significant change in traffic flows is predicted (using widely used and accepted criteria for determining significant change). The most appropriate criteria will be discussed with the IACC, and adopted for the assessment.

8.4.2 Assessment Methodology

Table 8.1 below contains a summary of the modelling requirements and proposed modelling/assessment techniques relating to each particular source of emissions to air.

Table 8.1: Modelling requirements and proposed modelling assessment techniques

Air Quality Sources	Modelling / Assessment Technique
Dust emissions from activities undertaken on the Wylfa Newydd Development Area during the construction phase	Construction dust risk assessment using the IAQM method to define the risk associated with a proposed development with regard to dust emissions. Once the risk of impact is determined, site-specific mitigation is developed to prevent dust emissions or reduce these to make sure that there are no significant off-site effects.
Combustion emissions i.e. NOx/NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$) from on-site construction plant and vehicles during the construction phase	Dispersion modelling using the ADMS dispersion modelling software. This is a detailed modelling approach which is used to calculate concentrations of pollutants at specific receptor locations or across a large grid of receptors due to emissions to air from the modelled industrial sources. The modelled concentrations are combined with the existing concentrations and compared to the relevant air quality standards or objectives.
Combustion emissions from stand-by electrical generation plant and steam-raising boiler plant during operation of the Power Station	
Combustion emissions from road vehicle movements on the road network during the construction and operational phases	Dispersion modelling using the ADMS-Roads dispersion modelling software. This is a similar approach to that described for the ADMS modelling above, but uses a software package that is specifically designed to model emissions to air from road traffic.

The magnitude and risk of emissions of dust during the Proposed Activities will be assessed in accordance with *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance* (IAQM, 2012), as will the impact of emissions from the increased number of construction vehicles using the methodology prescribed in the Department for Transport "*Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1: Air Quality*" and the associated DMRB Screening Method, developed by the Highways Agency. The significance of the potential impacts identified will be determined based on the sensitivity of the identified receptors within the potential zones of influence outlined in the IAQM Guidance.

Changes in air quality resulting from the road traffic emissions modelling will be described using the magnitude of change and impact descriptors set out in the '*Development Control: Planning for Air Quality*' (Environmental Protection UK (EPUK), 2010 and '*Land-Use Planning and Development Control: Planning for Air Quality '(EPUK/IAQM, 2015)*. This is consistent with the approach in the Draft IACC guidance, which recommends use of EPUK impact magnitude and air quality impact descriptors, albeit based on the 2006 EPUK guidance which was superseded by the current guidance.

Where applicable, the impact descriptors set out in the EPUK guidance would be used to inform the overall judgement of the significance of effects associated with the road traffic emissions from the Proposed Activities.

The air quality assessment process will be iterative, whereby mitigation measures identified as required in early assessments will be incorporated into the design of the Proposed Activities and inform the appropriate environmental management plan during construction, reducing the potential for significant impacts.

9 Noise and Vibration

This chapter describes the current environmental baseline for noise and vibration and potential effects associated with the Proposed Activities.

Noise and vibration can have an impact on the environment and on the quality of life enjoyed by individuals and communities. It may in certain circumstances lead to effects on human, ecological and infrastructure receptors. Potential noise and vibration effects are therefore typically considered during the EIA scoping process. NPS EN-6 suggests that:

"…*the operation of a new nuclear power station is unlikely to be associated with significant noise, vibration or air quality impacts*".

However, it does note that greater impacts may occur from construction and transport activities, or if cooling towers (especially forced draught cooling towers) are required. NPS EN-6 also states that "*With appropriate mitigation, the subsequent effect of these potential impacts on human health is unlikely to be significant*."

NPS EN-1 recognises that the likely noise impacts will be determined by the characteristics of the "*inherent operational noise*" from the Power Station Site and the proximity of noise sensitive receptors (both human and ecological). Note that the definition of noise provided in NPS EN-1 includes vibration. NPS EN-1 also sets out the requirements of a noise assessment, and these have been taken into account during the scoping process.

A number of different noise descriptors are commonly used for environmental noise assessments, each of which characterise the inherent variation in environmental noise levels in a different way. These descriptors include the following:

- L_{Aeq} – the energy average noise level. Widely used as a descriptor for environmental noise;
- L_{A90}– the level exceeded for 90% of the measurement time, which is often referred to as the 'background' noise level;
- L_{A10} – the level exceeded for 10% of the measurement time, and has been shown to correlate well with human response to road traffic noise; and
- L_{Amax} – the maximum noise level.

The peak particle velocity (PPV) parameter is commonly used to describe vibration.

9.1 Existing Environment

9.1.1 **Sensitive Receptors**

The noise and vibration assessments will include consideration of the following sensitive receptors in the vicinity of the Wylfa Newydd Development Area and associated transportation routes:

- human receptors – when present at noise-sensitive locations;
- ecological receptors – within land-based areas designated for protected species (fauna only) and in the marine environment; and

- infrastructure receptors – historic such as Listed Buildings and Registered Parks and Gardens, and contemporary such as the Existing Power Station and statutory or other underground services.

With respect to human receptors, Planning Guidance Technical Advice Note (Wales) 11: Noise (TAN11) focuses on residential properties as being noise sensitive; although it does cite developments such as offices, hospitals and schools as containing buildings and activities that are potentially noise sensitive. The Institute of Environmental Management and Assessment's (IEMA) Guidelines for Environmental Noise Impact Assessment (2014) detail additional noise sensitive receptor types, including:

- places of worship;
- open-air amenities;
- cemeteries;
- farms and kennels;
- retail premises; and
- some commercial and industrial installations.

For the purposes of this Scoping Report, users of open-air amenities are considered to include recreational walkers who use the Wales Coast Path and the associated PRoW network.

An analysis of the Ordnance Survey Address Point 2 data set has identified the following other types of receptor:

- Cemaes Primary School;
- St David's Church;
- offices;
- retail; and
- recreational receptors comprising playing fields, and football venue.

In addition to the playing fields and football venue identified, the recreational receptor group includes users of local footpaths and other PRoW within the study area, and leisure users of the sea.

The key ecological receptor identified is the Cemlyn Bay area of the Ynys Feurig, Cemlyn Bay and The Skerries SPA, which has been designated due to its importance to four species of breeding terns (see chapter 20 for further details). It is acknowledged that there are other designated sites within the noise and vibration study area, however these have been designated on botanical grounds and are not considered to be noise sensitive (even to changes in grazing wildlife potentially disturbed by noise from the Project). With respect to the ecological receptors, whilst there are no particularly sensitive wildlife receptors on the Site, the coastal habitats and offshore environment supports protected species (for example, nesting and feeding terns, and harbour porpoise and other marine mammals), and the potential effect on these will be included in the assessment. Underwater noise and vibration effects on ecological receptors are considered in chapter 16 (The marine environment).

Horizon (and their appointed agents or contractors) employees are protected by The Control of Noise at Work Regulations 2005 and The Control of Vibration at Work Regulations 2005 whilst at work, and are therefore scoped out from further consideration by the EIA process.

9.1.2 Baseline Conditions

A number of relevant noise monitoring surveys have been undertaken. Noise monitoring for this Project has been carried out since 2010, providing a baseline against which preliminary predictions of construction and operational noise levels can be made.

Table 9.1 lists baseline noise surveys undertaken in the vicinity of the Wylfa Newydd Development Area between 2010 and 2014. This includes measurements taken by the IACC in 2012 Since the Wylfa Newydd Generating Station will operate on a continuous basis, noise measurements were also undertaken on a continuous basis to ensure adequate characterisation of noise levels during the normal working day, evening, night time and weekend periods. Locations of all these baseline noise monitoring points and the study areas are shown in figure 9.1.

Table 9.1 Wylfa Newydd Development Area Baseline Monitoring Locations

Survey	Monitoring point reference	Location	Comments
Horizon 2010	A1	Felin Cafnan	Duration 1-2 weeks. Existing power station operating two reactors.
	A2	Tyn Refail, Tregele	
	A3	Clovelly, A5025	
	A4	Park Lodge, west of Cemaes	
IACC 2012	B1	Clovelly, A5025	Duration 2-3 weeks. Existing power station operational for majority of survey, with reactor 2 shutdown part way through survey at Cafnan.
	B2	Douglas Inn, Tregele	
	B3	Cafnan	
Horizon 2014	C1	10 Maes Capel	Duration 5-7 weeks. Existing power station operating one reactor.
	C2	Bron Wylfa, Fford Caergybi	
	C3	Ysgubor Ddergrm, Tregele	
	C4	Maes-y-Bugail (plus Swn-y-Mor for 2 weeks)	
	C5	Hafan (opposite Jam Factory)	
	C6	Tre'r-gof-isaf	

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Figure 9.1: Study area and monitoring locations for noise assessment

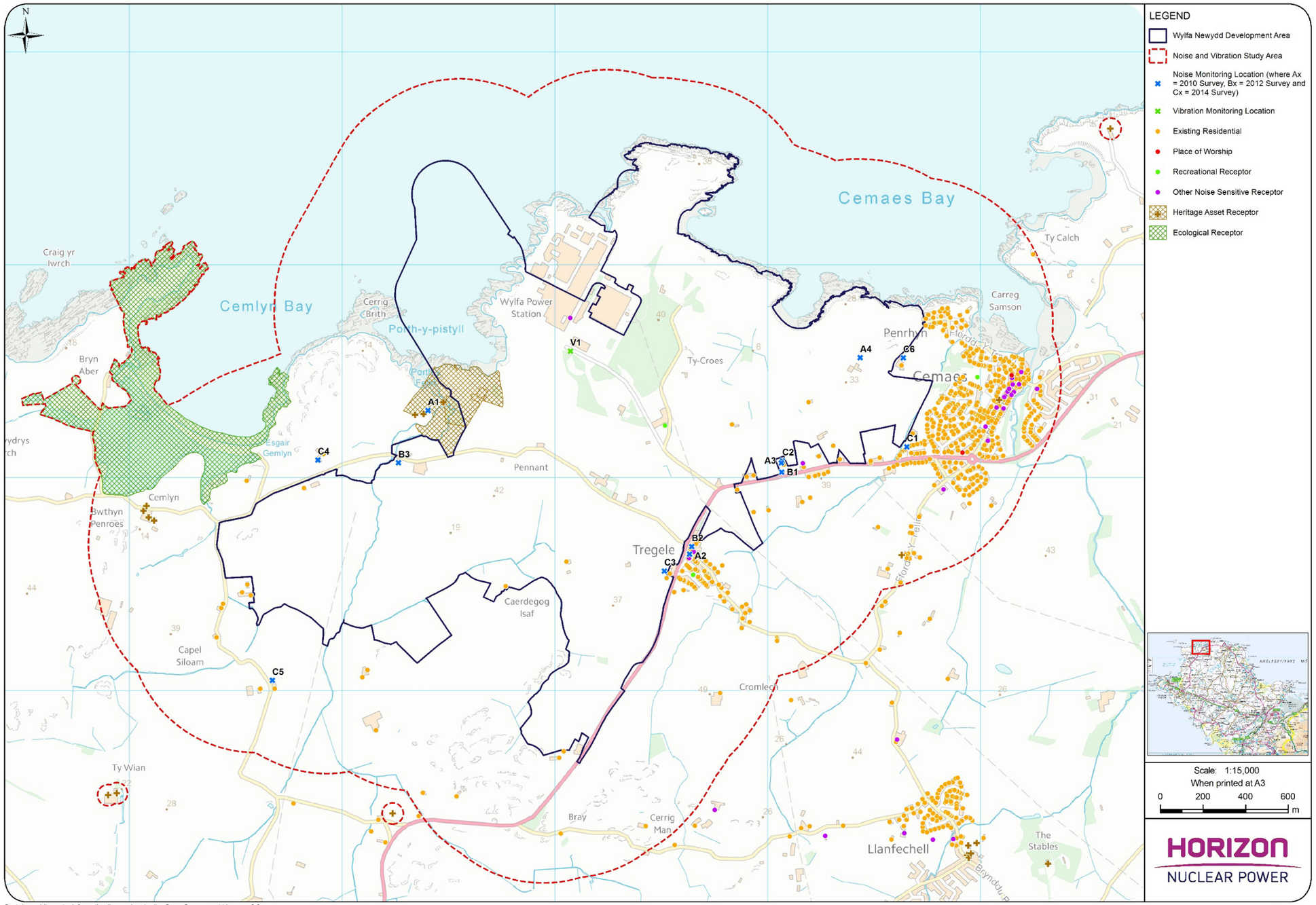

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FIGURE 9.1 / STUDY AREA AND MONITORING LOCATIONS FOR NOISE ASSESSMENT / 60PO8032_DCO_09_01

The aim of the 2010 baseline noise survey was to obtain a preliminary indication of the likely range of baseline noise levels, and to identify noise sources which may influence environmental noise levels. The survey indicated that noise levels were dominated by local and distant road traffic, noise generated by the passage of wind in vegetation and trees and some noise from the Existing Power Station. Noise from the National Grid transformers adjacent to the Existing Power Station includes 'audible tonality' (transformer hum), which has been the subject of some adverse community response in the past. This transformer is likely to be retained even when the Existing Power Station ceases electricity generation. The extent of the contribution of each of these noise sources will vary with weather conditions.

No observations on audible noise sources are included in the reports detailing the 2012 survey; however the results show that all of the locations showed a wide range in recorded noise levels, indicating that the noise environment is variable in the area.

The aim of the 2014 survey was to characterise the 'typical' existing noise levels at receptors in the vicinity of the Wylfa Newydd Development Area. In the daytime, noise sources identified at one or more receptors included road traffic, aircraft, the wind in vegetation, wildlife and farm animal sounds, agricultural machinery and a distant hum from the direction of the Existing Power Station. Night-time observations were typically of a hum or aerodynamic noise from the direction of the Existing Power Station, the wind, the sea, and occasional animal noises.

The 2014 survey results have been compared with the World Health Organisation's (WHO) Guidelines for Community Noise (1999) which presents guideline noise levels for community noise in specific environments. The typical daytime and evening baseline noise levels are all well below the guideline value associated with protecting the majority of people from "*serious annoyance*" in outdoor living areas. The typical night-time baseline noise levels all comply with relevant sleep disturbance guidelines.

In addition, reference has been made to the more recent WHO Night Noise Guidelines for Europe (2009). Comparison of the typical night time baseline results "*interim target level*" and "Night Noise Guideline" (NNG), indicates that whilst the interim target level was complied with at all locations, noise levels were equal to or marginally above the NNG at four locations. It should be remembered that the NNG is a yearly average noise level; hence these monitoring results are unable to fully confirm compliance or exceedance of this assessment criterion

In addition, in June 2015 a survey was undertaken to characterise existing noise levels at sensitive receptors in the vicinity of certain sections of the A5025 expected to experience noticeable changes in traffic noise. A combination of long term (1-2 weeks) and short term (3 hours in accordance with the Shortened Measurement Procedure published in *Calculation of Road Traffic Noise*) measurements were used, as detailed in table 9.2. The results are awaiting analysis.

Table 9.2: A5025 baseline noise monitoring locations

Receptor group	Long term monitoring location	Short term monitoring location
R1. Valley	Glyn Villa	Ynys Wen Cemetery
R2. Llanynghenedl		Layby adjacent to converted chapel
R3. Llanfachraeth	Erw Goch Bach Dolydd	

Receptor group	Long term monitoring location	Short term monitoring location
	Bryn Farm Field south east of Ysgol Llanfachraeth	
R4. Llanfaethlu	Rhos Ty Mawr Bryn Gwyn	Layby north of Rhos Ty Mawr
R5. Llanrhyddlad		Layby north of westerly turning for Clych y Garn
R6. Cefn Coch	Tyn Felin Rhandir	
R7. Tregele	Taldwrst	

Results from the 2015 survey are currently undergoing analysis.

9.2 Potential Effects and Mitigation

9.2.1 Potential effects

Possible sources of noise and vibration during activities included in the DCO application (associated with either the Power Station Site, wider Wylfa Newydd Development Area, or the Off-Site Power Station facilities comprise:

- Construction activities:
    - operation of machinery and mobile plant such as excavators, earth-movers, tipper trucks, pneumatic breaking equipment, generators, compressors, pumps, rock crushers, a concrete batcher, mobile cranes, piling plant and dredgers;
    - rock fracturing to facilitate the excavation of rock in excavation and dredging areas within the Wylfa Newydd Development Area. It is likely that fracturing will be undertaken using blasting methods similar to those commonly employed by the mineral extraction industry;
    - transportation of personnel, materials and equipment to and from the site(s) on the public highways; and
    - transportation of materials and equipment to and from the Power Station Site via marine vessels;
- Operational activities:
    - operation and testing of machinery such as transformers, turbine generator units, and pumps at the Power Station Site; and ventilation systems and emergency generators at both the Power Station Site and some Off-Site Power Station Facilities.
    - maintenance tasks including dredging;
    - transportation of personnel, materials and equipment to and from the site(s) on the public highways; and
    - transportation of materials and equipment to and from the Power Station Site via marine vessels;
- Decommissioning activities:

- operation of machinery and mobile plant such as excavators, earth-movers, tipper trucks, pneumatic breaking equipment, generators, compressors, pumps, rock crushers, mobile cranes.
- transportation of personnel, materials and equipment to and from the site(s) on the public highways; and
- transportation of materials and equipment to and from the Power Station Site via marine vessels.

The operation of the Wylfa Newydd Generating Station will involve various types of balanced rotating equipment such as seawater pumps, steam turbines and diesel generators, which have the potential to represent vibration sources. However, as all equipment will be located within large concrete structures, any vibration transmitted into the surrounding ground is likely to be negligible, and orders of magnitude lower than would be expected to give rise to nuisance or damage to properties. Similarly, no sources of vibration considered likely to result in potentially significant effects at receptors have been identified for the Off-Site Power Station Facilities. Therefore it is not proposed to include a quantitative assessment of operational vibration in the noise and vibration assessment.

Noise and vibration effects associated with the Wylfa Newydd Project are most likely to occur during the construction phase. The effects are most likely to be significant at sensitive receptors close to the site boundaries and transportation routes.

During operation of the Generating Station, potential noise effects can arise from systems such as transformers, turbine generator units, ventilation systems and pumps as well as transport to and from the site (such as workforce vehicles and routine deliveries). Other issues for consideration include occasional testing of safety and warning alarms.

9.2.2 Mitigation

Suggested mitigation measures set out in relevant policy documents such as NPS EN-1, Planning Guidance Technical Advice Note (Wales) 11: *Noise*, and IACC's *New Nuclear Build at Wylfa; Supplementary Planning Guidance* will be considered in the design of development proposals, including:

- engineering – controlling noise and vibration emissions at their source, for example by using quiet machinery, and preventing noise from travelling using noise barriers;
- lay-out - ensuring adequate distances between sources of noise or vibration and sensitive receptors, and locating buildings where there are natural or man-made landscape features to screen the noisiest parts of the developments;
- administrative - limiting the types of activities allowed, or the times of day (or year) that certain operations are allowed, or specifying acceptable noise limits; and
- sound insulation measures to dwellings

Where significant adverse changes to the noise environment at sensitive receptors are predicted by the modelling, mitigation measures would be implemented to prevent or minimise potential nuisance. The general principles of construction site noise and vibration control set out in in BS5228:2009 *Noise and Vibration Control on Construction and Open Sites* Parts 1 and 2 would be followed in drawing up mitigation and a construction environmental management plan. This requires that noise control measures to be adopted according to 'best practicable

means' which includes measures such as specification of plant equipment, hours of operation and HGV transport routes.

The Environmental Management Plans to be agreed for the construction and operational phases are likely to identify good practice noise and vibration control measures to be implemented during the construction and operation of the Project. They will also identify relevant working hours, noise and vibration limits, compliance monitoring methodologies, and response protocols to be followed in the event of a complaint.

9.3 Proposed Scope, Methodology and Criteria

9.3.1 Study Area

The topic study area for the Wylfa Newydd Development Area has been based on a buffer zone approximately 600m from its boundary. The topic study area has been identified using professional judgement and the DMRB, as there is no current authoritative guidance on how far a noise study area should extend from the construction activities or operational noise sources.

Whilst construction and operational noise may be audible at distances in excess of 600m, this topic study area is large enough to encompass the nearest noise sensitive receptors, which will be used to classify the maximum magnitude of any impacts. Based on the noise impact assessment of receptors within 600m, consideration has been given to the likelihood of significant noise effects outside the topic study area, and the study area will be extended where relevant.

For the purposes of assessing potential noise effects associated with road transport, the study area has been defined as 600m radius around the affected route, with reference to guidance in DMRB. Whilst it is acknowledged that DMRB is aimed at providing guidance on the assessment of new or altered roads, it is considered relevant to the assessment of changes in traffic on existing roads for the purposes of defining a study area. Roads are considered to be an 'affected route' if there is the possibility of a change of 1dB LA10 18hr or more in the short term or 3dB LA10 18hr or more in the long-term. It is acknowledged that DMRB states that a road in a rural area may have impacts beyond 600m, hence the study area will be kept under review during the Environmental Impact Assessment process, to ensure that all potentially significant road noise effects are identified.

A study area for ship noise has also been considered. Due to the high mobility of both the noise sources and recreational receptors for ship noise, instead of defining a fixed study area, noise predictions for a single ship movement will be undertaken at representative stand-off distances. If the additional Project related ship traffic is considered likely to result in an increase of 25% or more in total ship movements within a designated shipping lane, then the change in overall ship noise will be estimated.

All of the work undertaken so far relates to the main Power Station Site, but a similar approach will be taken to assess noise and vibration effects on any Off-Site Power Station Facilities that will be consented through the DCO.

9.3.2 Assessment Methodology and Criteria

The general approach to be adopted for the noise and vibration modelling and assessments which are required to support the DCO application have been agreed with NRW and IACC and is set out in the Horizon Document '*Noise and Vibration Modelling and Assessment Methodology Wylfa Newydd Project DCRM Ref Number: HNP-S5-PAC-REP-00014' (*Appendix D).

The noise modelling will be undertaken using the CadnaA software, supplemented where appropriate by the use of verified spread sheets, to implement recognised UK or International calculation standards. The data inputs required include 3-D information on the development and its surrounding area, and noise source emission data (including location, on-times, operational hours, numbers of items/movements etc.). The data inputs and model outputs for each specialist assessment are specific to the noise source under assessment.

The vibration modelling will be undertaken using spreadsheets to implement relevant national calculation standards. The calculation inputs will include data describing the development layouts and ground conditions, in addition to source specific parameters such as hammer energy for piling, and drum width for vibratory compaction.

The calculation methodologies, parameters, and relevant assessment guidance documents for both noise and vibration are summarised below in table 9.3.

Table 9.3: Summary of noise and vibration calculation methodologies, output parameters and assessment guidance

Topic	Calculation methodology	Parameter	Relevant assessment guidance (see references section for further details of documents)
Construction and Earthworks Noise	BS5228-1	$L_{Aeq\ T}$	BS5228 MTAN1 WHO Guidelines BS8233
Construction and Earthworks Vibration	BS5228-2	PPV	BS5228 MTAN1 BS6472
Power Station Operations	ISO 9613-2 BS EN 12354-4	$L_{Aeq\ T}$	BS4142 BS8233 WHO Guidelines H3
Road Traffic Noise	CRTN BS5228-1 ISO 9613-2	$L_{A10\ T}$ $L_{Aeq\ T}$ L_{Amax}	DMRB Noise Insulation Regulations
Ship noise emissions	ISO 9613-2	$L_{Aeq\ T}$	BS8233 WHO Guidelines BS4142

Topic	Calculation methodology	Parameter	Relevant assessment guidance (see references section for further details of documents)
Other noise sources	BS5228 ISO 9613-2	$L_{Aeq\ T}$	BS8233 WHO Guidelines BS4142
Cumulative Effects	Logarithmic decibel addition	$L_{Aeq\ T}$	BS8233 WHO Guidelines
Site Suitability	BS8233 and/or BS EN12354-3 for internal noise levels	$L_{Aeq\ T}$	TAN11 BS8233 WHO Guidelines

Conclusions on the effect and significance of generated noise will be drawn, based on the likelihood, or otherwise, of the proposed Generating Station development causing a complaint or exceeding defined absolute noise limits, to indicate whether noise level from the development would meet reasonable noise limit objectives.

Where a predicted adverse effect is considered excessive, or where tonal or impulsive character may occur, recommendations for mitigation will be put forward such that any residual impacts are reduced to an acceptable level.

10 Landscape and Visual

10.1 Introduction

The development of a new power station has the potential to affect the existing landscape and views of the site and surrounding area. This section of the Scoping Report describes the proposed approach and scope in relation to the landscape and visual effects assessment. Visual effects relate to perceived changes to views, while landscape effects are experienced byrelate to the physical landscape resource, such as changes to vegetation cover, landform, topography, watercourses, and the general landscape character.

This chapter focusses on the Power Station Site, but it is proposed to adopt a similar approach when assessing the Off-Site Power Station Facilities.

10.2 Existing Environment

10.2.1 Introduction

The landscape and seascape character has been evaluated and described through visits to the Power Station Site and its surroundings, supplemented by desk studies of published sources of information and policy documents, including:

- National Landscape Character Areas, NRW
- The Isle of Anglesey, Anglesey Landscape Strategy, Update 2011, IACC
- Draft AONB Management Plan Review, 2015 – 2019, IACC
- Review of Special Landscape Areas in Gwynedd and Anglesey, 2012, LUC for Anglesey and Gwynedd Joint Planning Policy Unit
- LANDMAP Level 3 Assessments, NRW
- Welsh Seascapes and their Sensitivity to Offshore Development, CCW, 2009
- Anglesey and Snowdonia, Seascape Character Assessment, Final Report, Fiona Fyfe Associates with Countryscape and SEACAMS (University of Bangor), August 2013

10.2.2 Landscape

The nearest settlements are at Tregele and Cemaes, which lie adjacent to the south-east and east respecitively. The Existing Power Station lies to the north-east and forms a prominent element in the landscape from many views. It sits within a landscape and planting scheme originally designed by renowned landscape architect Dame Sylvia Crowe.

The Power Station Site is located in the 'Anglesey Coast' National Landscape Character Area (LCA). Key characteristics include:

'*The coastline has great variety, from sheer coastal cliffs and dramatic rocky headlands, to small sandy coves and extensive low lying dunes and sandy estuaries... Pasture - Soils include deep loams supporting predominantly pastoral land cover with occasional hay meadows, away from the coastline... Cloddau – or earth bank field boundaries feature in the north and west with occasional stone walls, whereas hedges are more common in the south and east... Prehistoric and funerary sites - including standing stones... Coastal Settlements - often relating to former*

industry, such as the mining town of Amlwch at the foot of Parys Mountain... A number of prominent man-made landmarks - including... Wylfa Nuclear Power Station...'.

At the county level, the northern part of the Wylfa Newydd Development Area lies within the 'North West Coast' LCA while the southern part lies within the 'North West Anglesey' LCA. Relevant key characteristics include:

North West Coast (LCA 4):

'*For most part it is rocky, with Cemaes Bay providing the only sandy beach. Cemlyn Bay provides a different character, with a brackish lagoon entrapped by a crescent shaped shingle beach… A coastal path provides accessibility for most of the way giving a series of ever changing views… Despite the quiet, if exposed, nature of the area there is much evidence of man's activities... Perhaps the most conspicuous evidence of man's activities is the nuclear power station at Wylfa to the west of Cemaes.*'

North West Anglesey (LCA 5):

'The key feature of its character is the extensive drumlin field. This has resulted in the classic "basket of eggs" description for the landscape. The extent of this deposit is important in the Welsh context. The hillocks trend in a south-west to north-east direction and closely abut LCA 4 on the coast.… Interspersed with this landform are a number of hard rocky features such as Mynydd y Garn and Mynydd Mechell... Another, more distinctive feature of the landscape is the development of wind farms, particularly to the north of Llyn Alaw.'

The LANDMAP landscape classification provides a more detailed description of the three 'Visual and Sensory Aspect Areas' applicable to the Power Station Site:

'Wylfa Power Station':

"...the buildings are uncompromising cubes which loom on the skyline and are conspicuous against the backdrop of the sea from many miles around. From close up, it [the Existing Power Station] is partially screened by bunds and woodland.."

'North West Drumlins':

"...the basket of eggs glacial landscape of smooth oval hillocks and damp hollows is typically covered with regular medium-sized fields with hedges, mainly pasture for sheep and cattle, with some arable land. There are numerous small villages, hamlets and scattered farms, linked with small roads, giving a settled character to this quiet, unremarkable but pleasant landscape".

'North Coast':

"*A series of headlands project, and there are either low shallow cliffs behind or steep slopes up to higher land. For much of its length the coastal footpath runs alongside providing a series of changing views along the wild rugged coast and out to The Skerries... …Wylfa Power Station, set on its headland, is a conspicuous intrusion for several miles in both directions..."*

10.2.3 Seascape

The coastal location means that an assessment of the value and effects on the seascape character is also relevant. At the national scale, the Wylfa Newydd Development Area borders the 'Point Lynas to Carmel Head' seascape unit. Key characteristics are described as a:

"*…rocky, north facing convex coast comprising many small bays and headlands with low cliffs and only one small sandy beach; [Cemaes]. Undulating, glaciated, old rock coastal plateau supporting pastoral farming with areas of semi-natural vegetation; Few settlements, but the area contains a number of windfarms inland and Wylfa Nuclear Power Station on the coast; Exposed northern aspect with open sea and long views; Key cultural associations comprise the history of trade and shipping over many centuries and Wylfa Nuclear Power Station*".

At the county level, the Anglesey (and Snowdonia) Seascape Character Assessment characterises the seascape character of the coast adjacent to and in the vicinity of the Wylfa Newydd Development Area into two Seascape Character Areas, 'Amlwch and Cemaes', east of and including the Existing Power Station and 'Cemlyn Bay' to the west. Key characteristics are noted as:

Amlwch and Cemaes:

'Much of this area has an industrial feel due to its long association with copper mining and associated industries and export. There are several historic harbours and settlements, including Amlwch, Cemaes and Llaneilian…, but there is less tourist development than on many parts of the Anglesey Coast. Coastal views are dominated by the rocky shoreline, white water and rocks... Views inland are dominated by the distinctive profiles of Parys Mountain and Mynydd Eilian'.

Cemlyn Bay:

'...Cemlyn Bay is divided by a crescent-shaped shingle bar formed by longshore drift, but the inner area has not been tidal since the 1930s… The inland landscape is also distinctive with rolling drumlin fields; their gentle slopes contrasting with the straight lines of the stone walls which cross them. This is relatively low-lying coast, and the drumlin fields appear as egg-shaped mounds on the horizon when viewed from the sea... The rich variety of the local geology is illustrated at Trwyn Cemlyn to the west of Cemlyn Bay with its extensive range of multi-coloured pebbles overlying metamorphic rocks. To the east the landscape is dominated by the square shapes of the Wylfa power station in the adjacent SCA.'

Key characteristics of the Anglesey Coast in the vicinity of the Wylfa Newydd Development Area are also described in the Regional LCA (NRW):

'*The coastline has great variety, from sheer coastal cliffs and dramatic rocky headlands, to small sandy coves and extensive low lying dunes and sandy estuaries... Pasture - Soils include deep loams supporting predominantly pastoral land cover with occasional hay meadows, away from the coastline... Cloddau – or earth bank field boundaries feature in the north and west with occasional stone walls, whereas hedges are more common in the south and east... Prehistoric and funerary sites - including standing stones... Coastal Settlements - often relating to former industry, such as the mining town of Amlwch at the foot of Parys Mountain... A number of prominent man-made landmarks - including... Wylfa Nuclear Power Station...'.*

10.2.4 Key receptors

Landscape-related designations and features of particular value or note include:

- The Anglesey Area of Outstanding Natural Beauty (AONB), which marginally overlaps the western boundary of the Wylfa NPS Site (as set out in NPS EN-6) in the north-west.

- The North Anglesey Heritage Coast, which generally adjoins the AONB and extends along the majority of the coastline locally, though it excludes the section from just west of the Wylfa Newydd Development Area at Porth y Gwanhog to Trwyn n Penrhyn (Cemaes) to the east of the site.
- The current Special Landscape Area covering the gap in the AONB around Wylfa and to the south.
- Dame Sylvia Crowe's landscape design for the Existing Power Station.
- Local seascape character outside the Anglesey AONB and Anglesey Heritage Coast.
- Views from roads and the PRoW across and in the vicinity of the Wylfa Newydd Development Area, especially the Wales Coastal Path and Copper Trail.
- Views from local communities and private residential properties.
- Views from historic features and other areas of recreational and tourism interest with public access, such as the Llanfechell Standing Stones, and the historic churchyard at Llanbadrig Point.
- Parys Mountain: listed as a Landscape of Historic Interest in Wales, it provides notable evidence of mining for copper by the Romans and in the Bronze Age. It lies more than 5km east of the Wylfa Newydd Development Area.
- The Grade II Cestyll Garden, listed on the Cadw/ICOMOS Register of Historic Parks and Gardens in Wales and the associated kitchen garden, bordering and within the Wylfa Newydd Development Area respectively. This valley garden was associated with Cestyll House (now demolished), developed by Lady Violet Vivian in the 1920s.
- A Scheduled Ancient Monument (SAM) comprising a group of early Bronze Age standing stones in the order of 1km south of the Wylfa Newydd Development Area.
- Cafnan Listed buildings, associated with the former Cafnan Mill, including the Grade II Listed Corn Mill, Corn Drying House and Mill House at Felin Gafnan.
- Listed buildings in and around Cemaes and Cemaes Conservation Area.

Potential effects on the setting of the Parys Mountain Landscape of Historic Interest, Cestyll Garden and associated kitchen garden, Listed Buildings and Scheduled Ancient Monuments will be considered in the Archaeology and Cultural Heritage chapter of the Environmental Statement, with reference to the visual impact assessment where appropriate.

10.3 Potential Effects and Mitigation

10.3.1 Potential effects

The likely extent of visibility of the Power Station can be judged to a degree through interpretation of the views of the Existing Power Station. From distant locations such as Parys Mountain and Mynydd y Garn, the Existing Power Station is evident, but relatively unobtrusive. It is visible in the context of the drumlins of the coastal hinterland from some viewpoints, usually only partially, and tends to blend with the sky in many types of weather and lighting conditions. It is most visible from nearby headlands to the east and west, although even here its architectural design sits relatively comfortably into the local and wider landscape. A preliminary zone of theoretical visibility (ZTV) that indicates the visibility of the Power Station in the surrounding landscape has been established by computer modelling as shown on figure 10.1.

The AoS reported in NPS EN-6 notes that the proposals have the potential for adverse effects on landscape. The Wales Coast Path and North Anglesey Heritage Coast are noted as sensitive receptors in relation to landscape and visual effects. While the design and layout will be particularly sensitive to such constraints, the NPS anticipates that any new nuclear power station might be expected to lead to some adverse effect that it may not be possible to fully mitigate.

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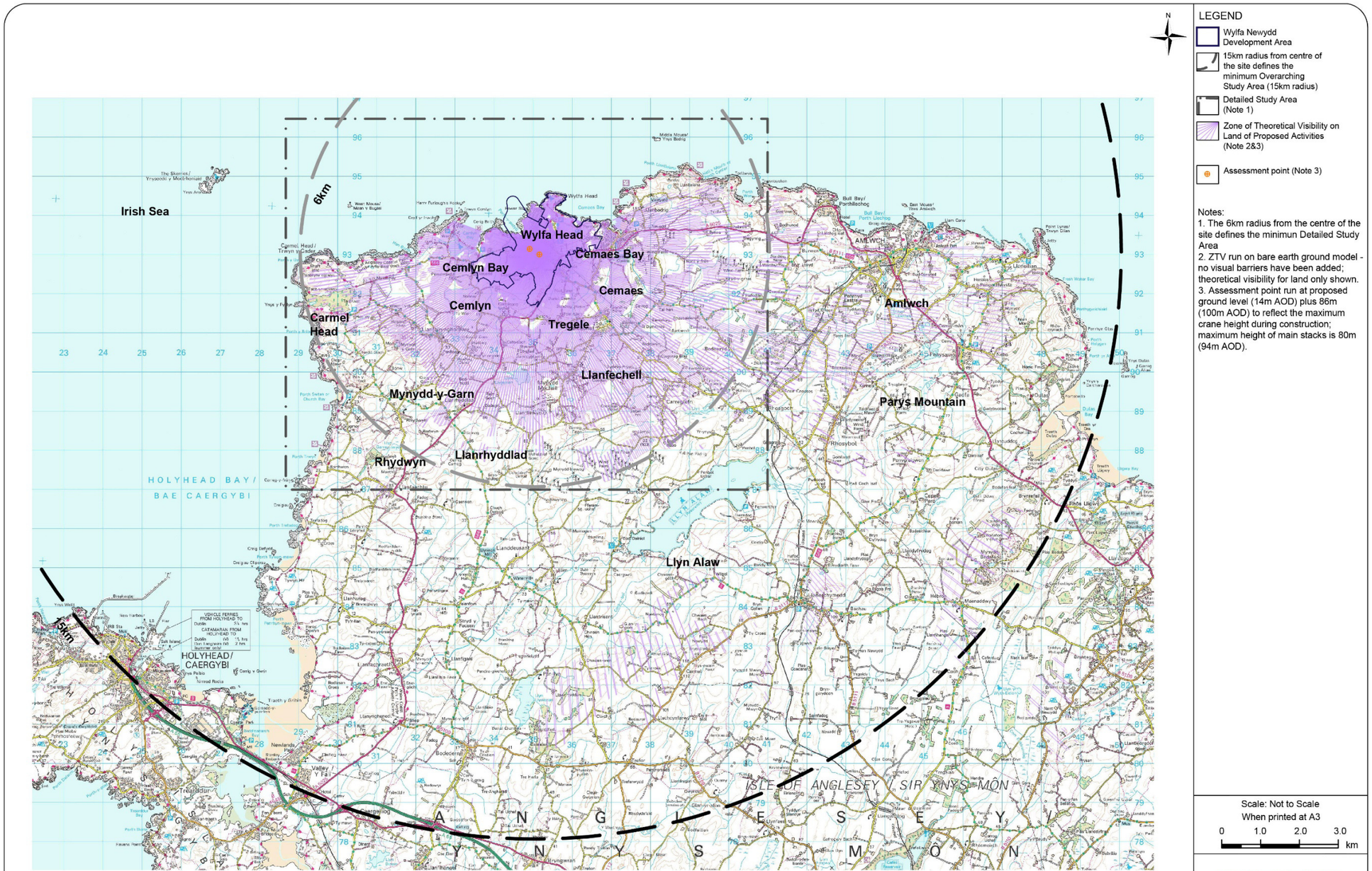
Figure 10.1: A preliminary zone of theoretical visibility (ZTV) (LVIA chapter from PEIR 2)



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10.3.2 Mitigation

A strategy has been developed to incorporate mitigation, such as consideration of an architectural design and colour scheme that blend some of the proposed buildings and structures appropriately with the background and local environment, while a LEMP will be produced, to provide an appropriate landscape setting for the Power Station through the use of landscape mounding and planting to help soften views and partially screen the Power Station, while creating opportunities to return land needed only during the construction phase to sensitively managed agricultural uses.

10.4 Proposed Scope, Methodology and Criteria

10.4.1 Study Area

The study area for the landscape and visual assessment has been determined by the extent to which the Proposed Power Station is likely to be visible from the surrounding landscape. A preliminary ZTV was established, based on the location and heights of the largest proposed buildings and structures. The preliminary ZTV plan is shown on figure 10.1. This shows that theoretical visibility is principally concentrated within 6km of the two proposed main stacks located towards the centre of the Wylfa Newydd Development Area site boundary, with 'pockets' of theoretical visibility extending up to approximately 11km from the site boundary to the south and east, and approximately 14km to the south-east.

The likelihood of significant landscape and visual effects diminishes with increasing distance from a proposed development, and a two tier study area has therefore been adopted:

- an overarching study area based on the full extent of theoretical visibility, which extends up to 15km from the tallest proposed structures in the centre of the Wylfa Newydd Development Area; and
- a detailed study area which extends up to 6km from the tallest proposed structures, where theoretical visibility is principally concentrated and where there is greater potential for significant landscape and visual effects.

A detailed assessment of views from residential properties within 1km of the Wylfa Newydd Development Area boundary will also been undertaken. Beyond 1km it is considered unlikely that there would be any significant visual effects on residential receptors, due to the presence of intervening surface features, including garden vegetation, and the nature of views from property windows and gardens. Beyond this distance, the assessment of visual effects will be based on the assessment of representative viewpoints from publicly accessible locations.

10.4.2 Assessment Methodology and Criteria

The overarching NPS EN-1 gives general guidance on assessing the likely significant environmental effects of energy projects, including the need for an assessment of the measures envisaged for avoiding or mitigating significant adverse effects.

The NPS EN-6 sets out national policy against which proposals for major projects will be assessed and determined. NPS EN-6 defines the Wylfa Newydd Development Area for New

Nuclear Build at Wylfa, and acknowledges the potential for some adverse impact, which it may not be possible to fully mitigate (paragraph C.9.71 in Volume II).

The construction of the Generating Station will inevitably result in changes to the landscape and visual amenity of the area. A landscape and visual assessment will therefore be undertaken to assess the potential impacts of the proposed development on the surrounding landscape and visual amenity area.

The relevant policies relating to landscape character in New Nuclear Build at Wylfa: Supplementary Planning Guidance and the current Development Plan and emerging Anglesey and Gwynedd JLDP will also be considered during the assessment process.

The landscape and visual assessment activities will include the following:

- Desktop and field surveys to determine the extent to which the Wylfa Newydd Development Area is visible within the landscape (baseline visual envelope) and computer modelling to predict the theoretical visibility of the proposed development (the ZTV).
- On-going definition of visual receptors and agreement of study area and locations of key representative viewpoints (from publicly accessible locations such as roads, PRoW and other publicly accessible land) with IACC and NRW through pre-application consultation and on-going stakeholder engagement.
- A detailed appraisal of the existing landscape resource and potential receptors.
- In accordance with guidance in NPS EN-6, a landscape character assessment will be undertaken to supplement the published Level 3 LANDMAP character assessment in greater detail in the vicinity of the Power Station Site.
- A local seascape assessment of the coast in the vicinity of the Power Station Site.
- Production of photomontage visualisations from key representative public viewpoints to represent the anticipated changes in views as a result of the Project.
- Night-time effects will also be assessed from key public viewpoints to inform a lighting strategy aimed at minimising light spill or 'skyglow' as far as possible (taking into account safety and security requirements).

In line with best practice, the sensitivity of the landscape and visual receptors will be evaluated, followed by a prediction of the magnitude of the change that each will experience as a result of the Project. These will be combined to determine the significance of the effect during construction, at commissioning and at approximately 15 years after commissioning and during decommissioning.

Best practice methodologies for landscape and visual assessment will be agreed with the local planning authority prior to commencement of the assessment. These will be derived from recognised guidance documents including:

- *DoE Good Practice Guide on Environmental Assessment*
- *Guidelines for Landscape and Visual Impact Assessment, 3rd edition*

10.4.3 Cumulative effects

The proposed development will be constructed on land adjacent to the Existing Power Station and there will be a period of time when all or part of the Existing Power Station is present

alongside the new Power Station. The landscape and visual impact of the new station will therefore need to be considered in the context of the existing baseline with the Existing Power Station present. The cumulative impacts of demolition activities associated with the decommissioning of the Existing Power Station and any other relevant activities will also be assessed.

11 Terrestrial and Freshwater Ecology

11.1 Introduction

This chapter of the Scoping Report looks at terrestrial and freshwater ecology issues that are likely to be considered in the EIA. The marine environment is considered separately in chapter 16. In terms of ecology, the scoping analysis and assessment recognise that these topics are closely related, with many species using both habitat types.

The environment in the Wylfa Newydd Development Area and its surroundings has already been the subject of extensive surveys, modelling and related investigations, though some are on-going. A summary of the approach, surveys and the resulting information is given here. The chapter focusses on the Power Station Site, but a similar approach will be used when assessing the Off-Site Power Station Facilities, once the locations have been finalised.

Information on the baseline situation obtained from field survey has been supplemented by searches of published data. Details of the relevant conservation designations and protected species are also provided.

11.2 Existing Environment

The study area for terrestrial and freshwater ecology includes the Wylfa Newydd Development Area and a buffer zone of approximately 500m, taking into account European and nationally designated sites. Figure 11.1 shows the general extent of study area.

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Figure 11.1: Study Area for Terrestrial and Freshwater Ecology Sites of Nature Conservation Importance

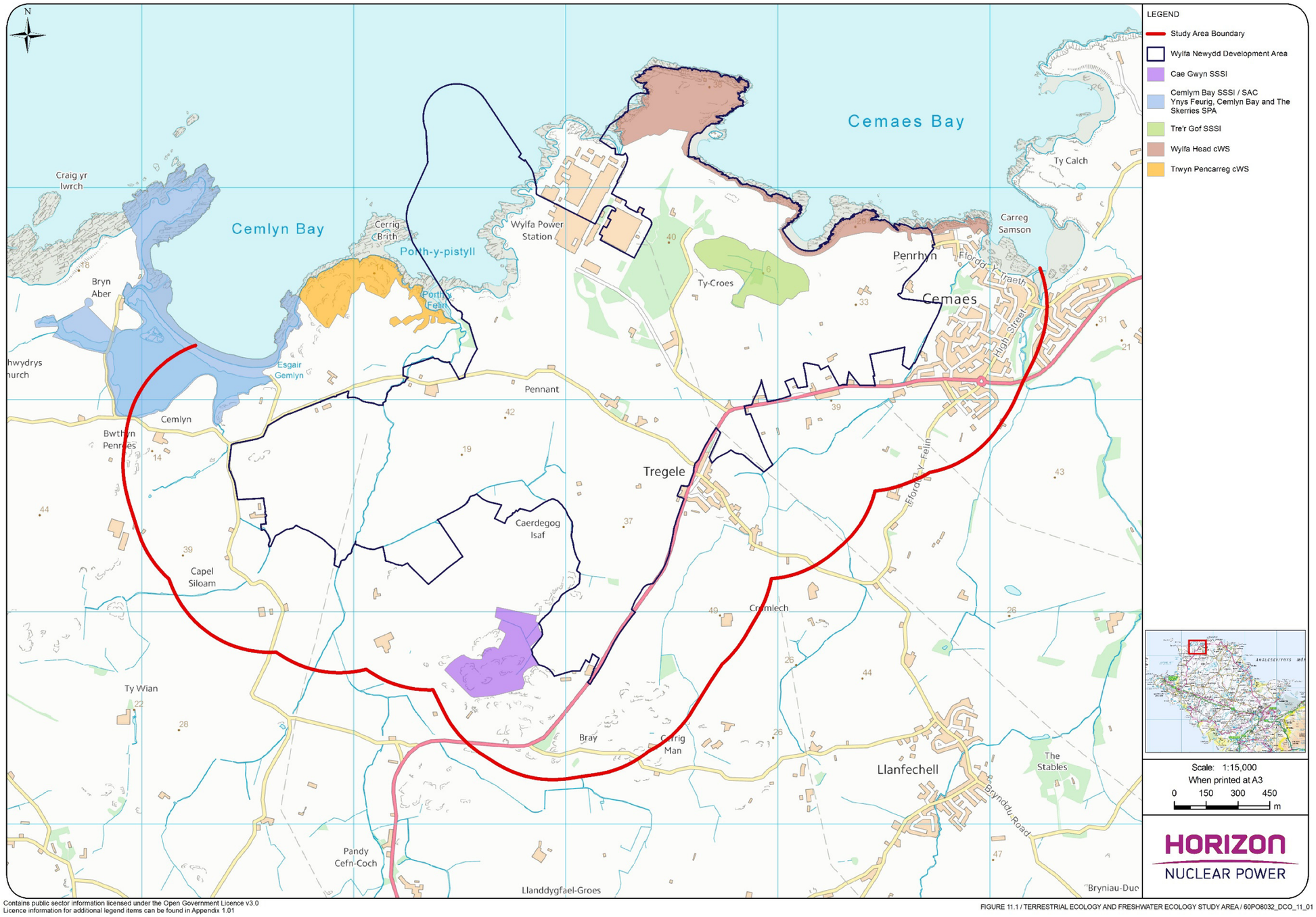

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FIGURE 11.1 / TERRESTRIAL ECOLOGY AND FRESHWATER ECOLOGY STUDY AREA / 60PO8032_DCO_11_01

A total of seven statutory designated and non-statutory designated sites for nature conservation have been identified due to their location either within the study area or outside this boundary in areas with terrestrial and/or freshwater receptors that could be affected by the DCO proposals.

Table 11.1 lists these sites along with the primary reasons for their designation and the value and sensitivity rating assigned to each site. The location of these sites is shown in figure 11.1

Table 11.1 Statutory and non-statutory designed sites for nature conservation within 500m of the study area

Site	Designation	Approximate distance from Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology	Value / Sensitivity
Tre'r Gof	SSSI	In the Wylfa Newydd Development Area	Rich fen habitat with a wide-range of wetland plant species, including fen sedge (*Cladium mariscus*) and black bog-rush (*Schoenus migricans*).	High
Wylfa Head	Candidate LWS (cLWS) (non-statutory)	In the Wylfa Newydd Development Area	A mixture of coastal grassland with some areas of heather (*Calluna vulgaris*). The site is notable for choughs (*Pyrrhocorax pyrrhocorax*) which breed on the cliffs, a colony of gulls which nest near Porth Wnal, and harbour porpoise (*Phocoena phocoena*) that frequent the waters around the headland.	Medium
Cae Gwyn	SSSI	Within 100m	Two wetland areas separated by an area of heathland. Wetland areas contain bogmoss (*Sphagnum spp.*), common wetland herbs and royal fern (*Osmunda regalis*) and mud sedge (*Carex limosa*).	High
Trwyn Pencarreg	cLWS	200m north-west of the Wylfa Newydd Development Area	Coastal and semi-improved grassland adjacent to Porth-y-pistyll and Cemlyn Bay. It is identified in the Anglesey Joint Local Development Plan but the reasons for inclusion as a candidate site are not provided. The approach used has therefore been to assume that the designation is based on the unimproved grassland habitats present. These habitats show evidence of being under the same management regime for many years.	Medium
Cemlyn Bay	SAC	400m	Coastal lagoon habitat, including a bryozoan (*Conopeum seurati*), the lagoon cockle (*Cerastoderma glaucum*) and the lagoonal mud snail (*Ventrosia ventrosa*).	High
Cemlyn Bay	SSSI	400m	Breeding bird assemblage – Arctic tern (*Sterna paradisaea*), common tern (*Sterna hirund*o), roseate tern (*Sterna dougallii*), and Sandwich tern (*Thalasseus*	High

Site	Designation	Approximate distance from Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology	Value / Sensitivity
			sandvicensis). Coastal lagoon and vegetated shingle which is characterised by sea kale (*Crambe maritime*), sea radish (*Raphanus raphanistrum ssp. Maritimus*) and yellow horned poppy (*Glaucium flavum*).	
Ynys Feurig, Cemlyn Bay and The Skerries	SPA	400m	The SPA supports four species of breeding tern: Arctic tern (five year mean of 1,290 pairs representing 2.9% of population in the UK, 1992-1996); common tern (five year mean of 189 pairs representing 1.5% of population in the UK, 1992-1996); roseate tern (five year mean of three pairs representing 5% of population in the UK, 1992-1996); Sandwich tern (five year mean of 460 pairs representing 3.3% of population in the UK, 1993-1997) (JNCC, 2015[8]).	High

11.2.1 Background Data Searches

Establishment of the ecological baseline in the study area has been informed by searches of published and background data including information from Cofnod (the North Wales Environmental Information Service) and other species specific data searches e.g. National Otter Survey (Anglesey Otter Project) records.

11.2.2 Terrestrial Ecology Baseline Surveys

A range of baseline surveys, covering key terrestrial ecological species, have been undertaken since 2009 within the study area. These include the following:

- Phase 1 Habitat Survey (Jacobs, 2013[9]);
- National Vegetation Classification (NVC) surveys (Jacobs, 2015[10]);
- fungi surveys of key habitats (coastal scrub, heath, grassland, amenity areas and woodland) within the Wylfa NPS Site (Jacobs, 2014[11]);

[8] JNCC. 2015. SPA description (information as published 2001) – Ynys Feurig, Cemlyn Bay and The Skerries. http://jncc.defra.gov.uk/default.aspx?page=2055. [Accessed: 03.08.2015].

[9] Jacobs. 2013. *Consultancy Report: A Phase 1 Habitat Survey*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

[10] Jacobs. 2015. *Consultancy Report: NVC Technical Summary Report*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

[11] Jacobs. 2014. *Consultancy Report: A Baseline Assessment of the Fungi of Key Habitats within the Wylfa NPS Site*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

- baseline lichen surveys focussed on those areas with the potential to support the highest number of species or were the most likely to result in notable species being found (Jacobs, 2014[12]);
- surveys for bryophytes within the topic study area in areas thought most likely to support more diverse communities or rare species (Jacobs, 2014[13]);
- surveys for terrestrial invertebrates completed at 17 sites within the topic study area (Jacobs, 2015[14]);
- surveys for great crested newt (*Triturus cristatus*) and other amphibians have been completed in all accessible waterbodies with the potential to support breeding amphibians in the topic study area (Jacobs, 2014[15]);
- reptile surveys carried out in many locations within the topic study area since 2010 over four survey seasons (Jacobs, 2015[16]);
- breeding bird surveys over five breeding seasons during transects, targeted vantage point surveys and incidental observations (Jacobs, 2015[17]);
- over-wintering and passage bird surveys for over five separate survey periods (Jacobs, 2015[18]);
- bat surveys undertaken within the topic study area every year since 2009 (Jacobs, 2015[19]);
- otter (*Lutra lutra*) surveys completed in all watercourses within the topic study area including coastal habitats (Jacobs, 2015[20]);
- water vole (*Arvicola amphibius*) surveys (Jacobs, 2015[15]); and
- other mammal species surveys e.g. brown hare (*Lepus europaeus*), hedgehog (*Erinaceus europaeus*), and polecat (*Mustela putorius*).

[12] Jacobs. 2014b. *Consultancy Report: Baseline Lichen Surveys 2013*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

[13] Jacobs. 2014. *Consultancy Report: A Baseline Assessment of the Bryophytes of Key Habitats within the Wylfa NPS Site*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

[14] Jacobs. 2015. *Consultancy Report: Terrestrial Invertebrates Technical Summary Report*, unpublished report on behalf of Horizon Nuclear Power Ltd.

[15] Jacobs. 2014. *Consultancy Report: NPS Site Great Crested Newt Baseline Surveys 2014*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

[16] Jacobs. 2015. *Consultancy Report: Reptile Technical Summary Report*, unpublished report on behalf of Horizon Nuclear Power Ltd.

[17] Jacobs. 2015d. *Consultancy Report: Breeding Bird Technical Summary Report*, unpublished report on behalf of Horizon Nuclear Power Ltd.

[18] Jacobs. 2015. Consultancy Report: Over-wintering and Passage Birds Technical Summary Report, unpublished report on behalf of Horizon Nuclear Power Ltd.

[19] Jacobs. 2015. Consultancy Report: Bat Technical Summary Report, unpublished report on behalf of Horizon Nuclear Power Ltd.

[20] Jacobs. 2015. *Consultancy Report: Otter and Water Vole Technical Summary Report*. Unpublished report on behalf of Horizon Nuclear Power Ltd.

11.2.3 Freshwater Baseline Surveys

A range of baseline surveys, covering key freshwater ecological species, have been undertaken within the study area. These include the following:

- site walkover undertaken in 2011 and 2012 assessing principle habitats of interest and determining substrate form, bank structure and riparian land use;
- water quality surveys using spot sampling between 2011 and 2015;
- macrophytes surveys of all watercourses in the study area in 2012, 2013 and 2015;
- aquatic invertebrate surveys using kick sampling each year between 2011 and 2015; and
- fish surveys using electro-fishing in 2011 and between 2012 and 2015.

11.2.4 Terrestrial Habitats Baseline Survey Results

Phase 1 Habitat Surveys and NVC surveys have identified a range of terrestrial habitats present within the study area, as shown in figure 11.2 and figure 11.3, respectively.

A number of habitats are listed in accordance with the requirements of Section 42 of the Natural Environment and Rural Communities Act (NERC) 2006[21] as habitats of 'principal importance'. These are: dwarf shrub heath / upland heathland (coastal grassland heath-grassland mosaic); upland fen; linear areas of reedbed and scattered ponds; marsh and swamp; and wet woodland / willow scrub. These are also listed within the Anglesey Local Biodiversity Action Plan[22] and are shown in figure 11.4.

[21] Hereafter all habitats and species listed in accordance with the requirements of Section 42 of the NERC Act 2006 will be referred to as Section 42 habitats / species.

[22] Anglesey's LBAP. 2015. https://ukbars.defra.gov.uk/archive/plans/lbap_plans.asp?LBAP=%7b42A89BF7-2E26-4C14-8253-40937ACA129D%7d. [Accessed: 27.08.2015].

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Figure 11.2: Phase 1 Habitat map

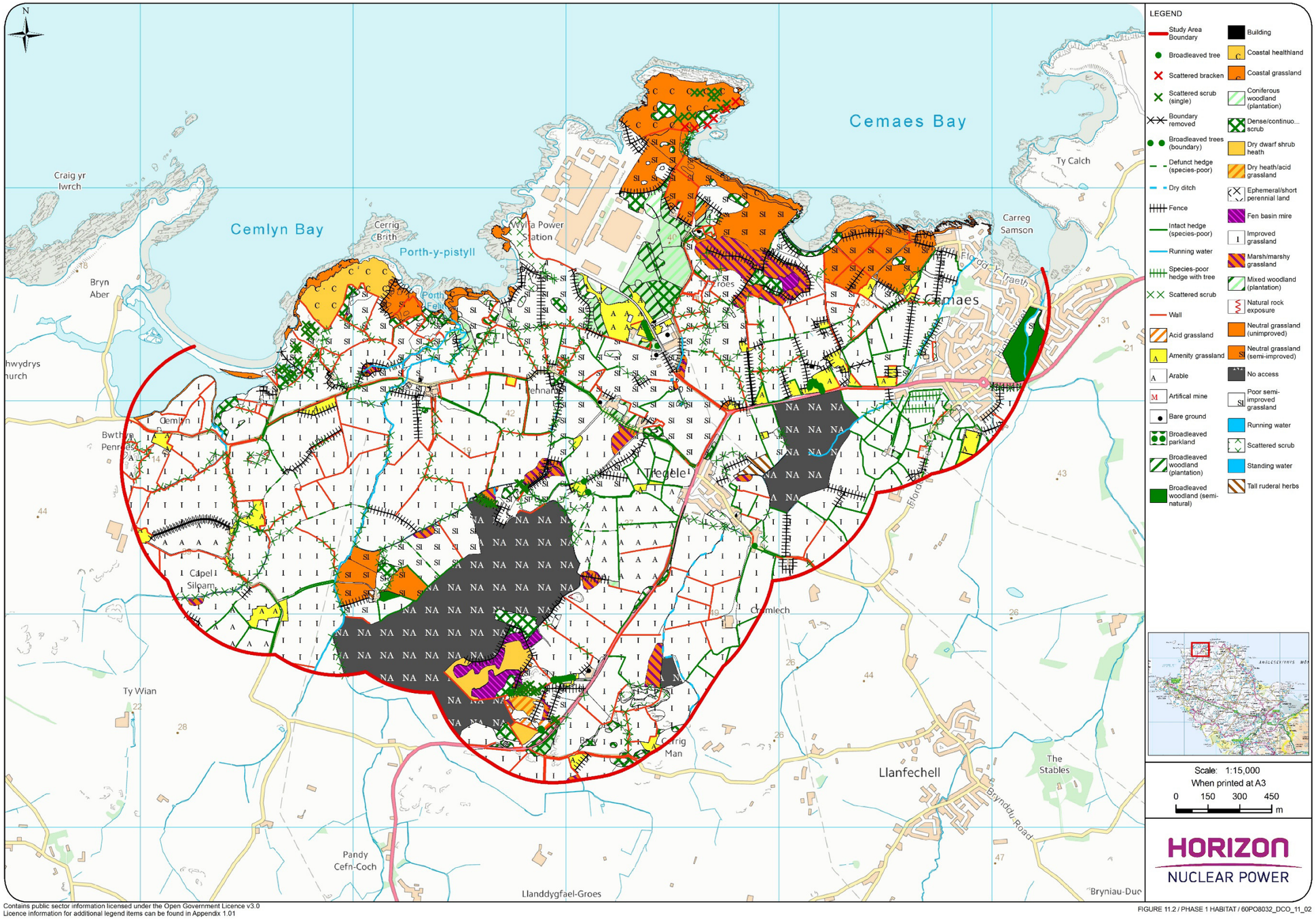

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FIGURE 11.2 / PHASE 1 HABITAT / 60PO8032_DCO_11_02

Figure 11.3: Extent of National Vegetation Classification surveys

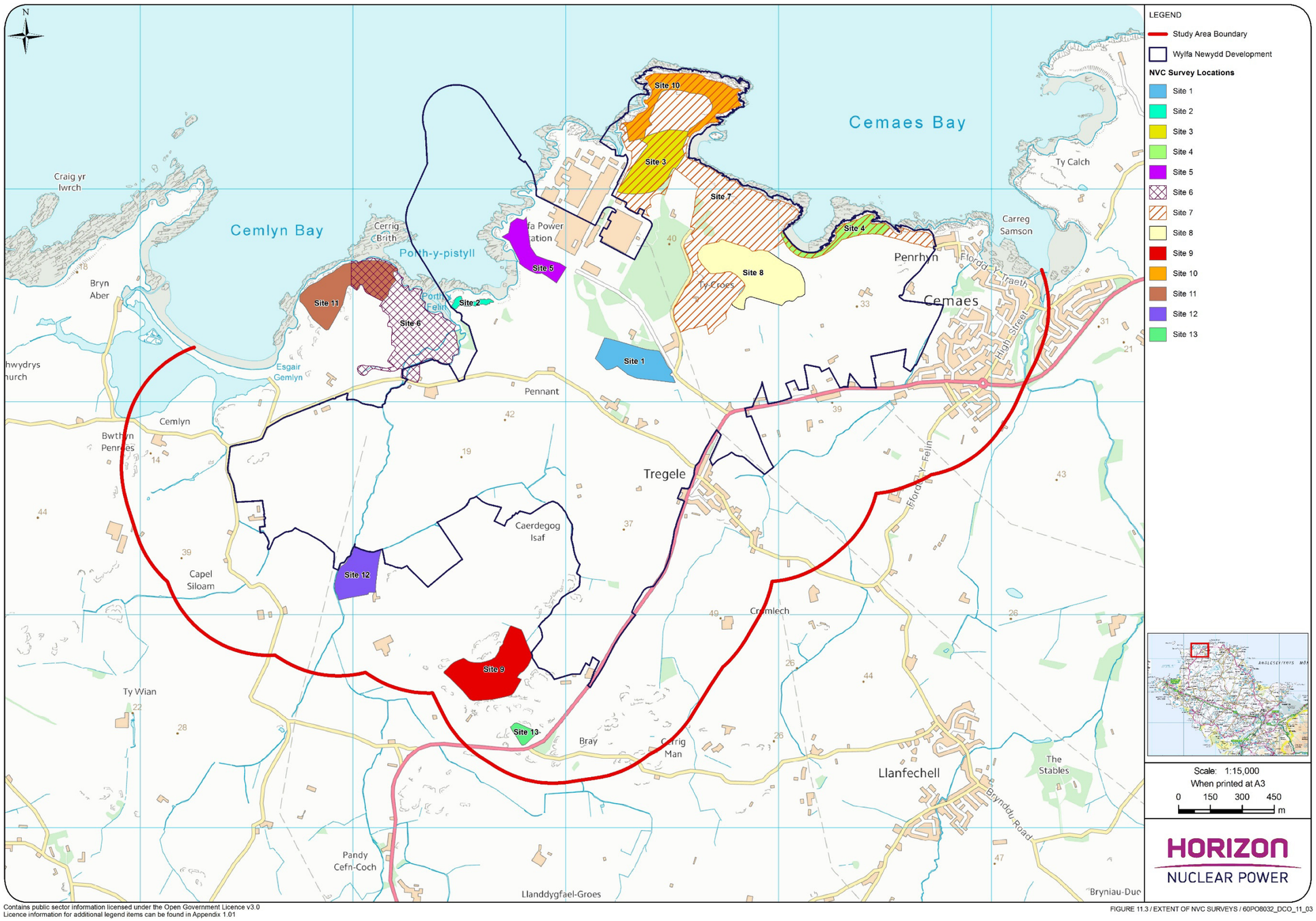

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FIGURE 11.3 / EXTENT OF NVC SURVEYS / 60PO8032_DCO_11_03

Figure 11.4: Extent of habitats listed in accordance with the requirements of Section 42 of the NERC Act 2006

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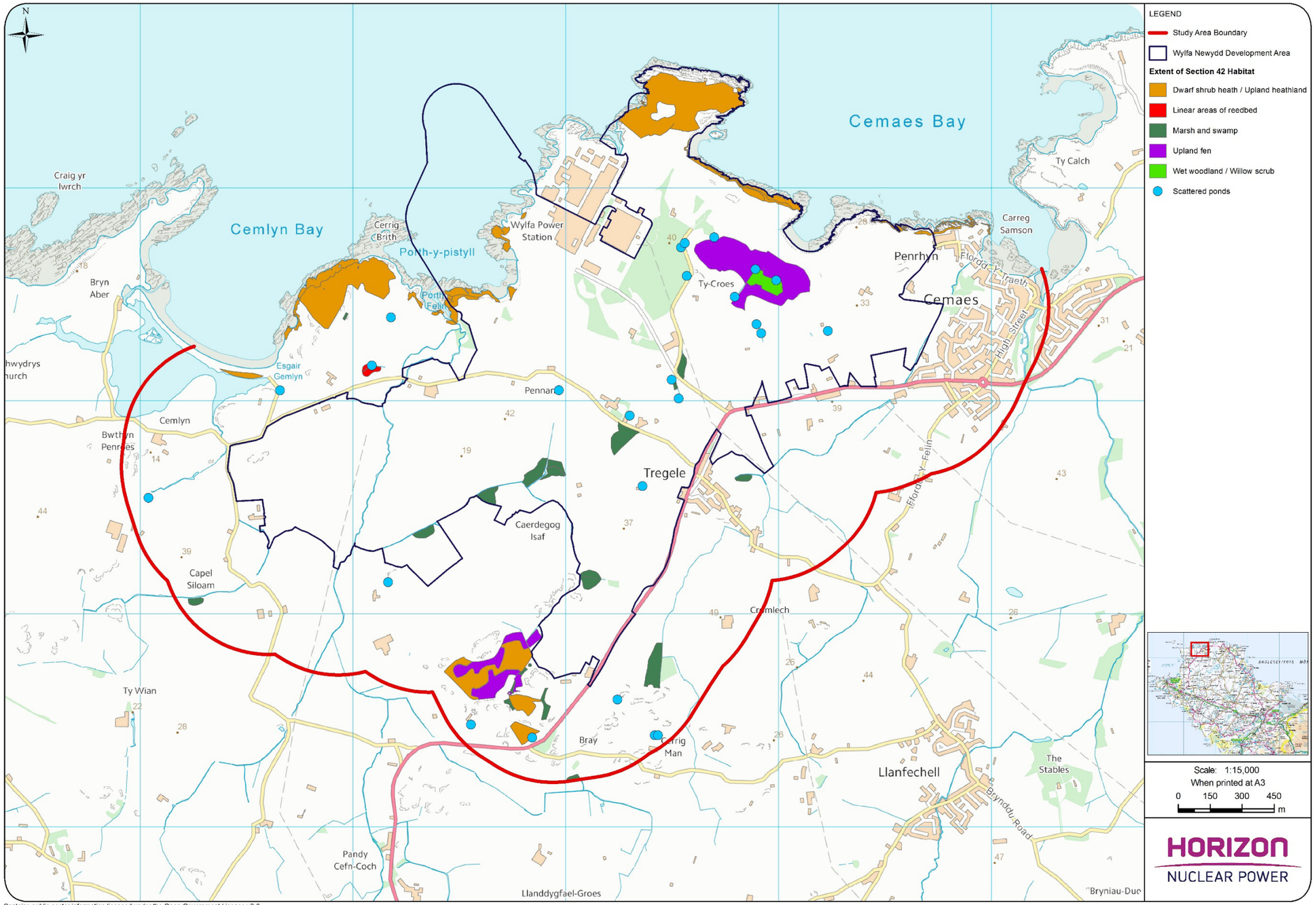

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FIGURE 11.4 / EXTENT OF SECTION 42 NERC ACT 2006 HABITAT / 60PO8032_DCO_11_04

The value and sensitivity of the vast majority of habitats in the topic study area is considered to be **low**. However, Section 42 habitats with heath / coastal grassland mosaic habitats (as key features of the Wylfa Head cLWS) have **medium** value and sensitivity.

11.2.5 Terrestrial Species Baseline Survey Results

Surveys identified evidence of protected and notable species, the key results of which are presented in table 11.2, with classifications of value and sensitivity provided.

Table 11.2 Summary of terrestrial ecology baseline survey results

Ecological receptor	Results summary and value / sensitivity
Fungi	The survey recorded 85 species that are not protected or notable. Overall the lack of protected, rare or notable species suggests that the communities of fungi within the topic study area are of **negligible** value.
Lichen	In total the surveys recorded 262 taxa of lichen of which one species is listed in accordance with the requirements of Section 42 of the NERC Act (*Schismatomma graphidiodes*), 26 are Nationally Scarce, two are Nationally Rare, three are Red Data Book Vulnerable listed, four are International Responsibility, and 21 were new Vice County records for Anglesey. The value and sensitivity of the lichen in the topic study area is considered to be **medium**, based on the quality of habitats at Trwyn Pencarreg, and the number of notable species recorded. However, it should be recognised that the total area of habitat where the lichen rich substrates are found is small when compared to the total area of the Wylfa Newydd Development Area.
Bryophytes	The survey recorded 126 species of bryophytes of which none are notable species. However, the survey did record eight species that are rare on Anglesey. The value and sensitivity of the majority of the bryophyte communities in the topic study area is considered to be **negligible**, as 94% of species found were common and widespread. The remaining 6% were only notable due to their distribution on Anglesey and are not of national concern.
Protected plant species	The Phase 1 Habitat Surveys and NVC did not find any plant species that receive legal protection. The value and sensitivity of vascular plant species outside the statutory designed sites for nature conservation in the topic study area is therefore considered to be **negligible**.
Terrestrial invertebrates	The terrestrial invertebrate surveys have produced a species list for the topic study area which totals 717, of which 88 are of increased conservation status. Only four species found have any legal protection status and comprise the following species of Lepidoptera listed in accordance with Section 42 of the NERC Act 2006: grayling (*Hipparchia semele*), small heath (*Coenonympha pamphilus*), wall (*Lasiommata megera*), and the cinnabar moth (*Tyria jacobaeae*). The value and sensitivity of the terrestrial invertebrate communities in the topic study area is considered to be **low**. The assessment is based on the presence of four species listed in accordance with Section 42 of the NERC Act, and that only 12% of the species found have any elevated conservation status.

Ecological receptor	Results summary and value / sensitivity
Great crested newt	Surveys have not found great crested newts breeding in any pond. A single great crested newt was incidentally recorded in terrestrial habitat near Cae Gwyn SSSI in 2013 within 500m of ponds on land that is not currently accessible (landowner permission has been refused). There is therefore the potential for a great crested newt breeding pond to be present within 500m of the Wylfa Newydd Development Area. Given this level of uncertainty it is necessary to adopt a precautionary approach to valuing this receptor and it is therefore assigned a **medium** value, based primarily on its level of protection.
Other amphibians	Surveys recorded common toads (*Bufo bufo*) breeding in numerous ponds throughout the topic study area. Surveys also recorded common frog (*Rana temporaria*) and palmate newts (*Lissotriton helveticus*) in many ponds. The value and sensitivity of the site for amphibians (excluding great crested newts) is considered to be **low**. This is primarily due to the abundance and widespread distribution (regionally and nationally) of the species recorded on site, but taking account of the declining national status of common toad and its listing in accordance with the requirements of Section 42 of the NERC Act.
Reptiles	The results found several scattered populations of adder (*Vipera berus*) and common lizard (*Zootoca vivipara*). The value and sensitivity of the reptile populations in the topic study area is considered to be **low** due to the small populations present and the widespread distribution of the species found.
Chough	Chough (*Pyrrhocorax pyrrhocorax*) is known to be present year-round and is breeding within the topic study area. The species is a key feature of Wylfa Head cLWS and therefore has a separate value and sensitivity to other bird species. The value and sensitivity of the chough population in the topic study area is considered to be **medium**.
Breeding birds	Surveys have recorded 104 species of breeding bird over five breeding seasons. Eighty-nine of these species were considered to have bred within the topic study area of which 46 are notable species i.e. those species that are afforded special protection or are of conservation concern. Surveys also recorded three Schedule 1 species that are breeding or likely to be breeding in the topic study area: barn owl (*Tyto alba*), merlin (*Falco columbarius*) and peregrine falcon (*F. peregrinus*). The compiled species list of breeding birds from all five years of survey data is not considered to be exceptional for a site as large as the study area. Hence, the value and sensitivity of the breeding birds assemblage is considered to be **low**.

Ecological receptor	Results summary and value / sensitivity
Over-wintering and passage bird species	Surveys have recorded a total of 99 over-wintering and passage bird species, of which 62 species are notable. Many of the notable records are of individual birds, low numbers of birds, or species recorded in one year only. Large flocks (greater than five birds) of 21 notable species were recorded during surveys comprising: black-headed gull; chough; curlew (*Numenius arquata*); fieldfare (*Turdus pilaris*); great black-backed gull (*Larus marinus*); greylag goose (*Anser anser*); herring gull; house sparrow (*Passer domesticus*); lapwing (*Vanellus vanellus*); linnet (*Carduelis cannabina*); mallard (*Anas platyrhynchos*); meadow pipit (*Anthus pratensis*); oystercatcher (*Haematopus ostralegus*); redwing (*Turdus iliacus*); skylark (*Alauda arvensis*); snipe (*Gallinago gallinago*); song thrush (*Turdus philomelos*); starling (*Sturnus vulgaris*); teal (*Anas crecca*); widgeon (*Anas penelope*); and woodcock (*Scolopax rusticola*. The actual numbers of species recorded in more than one year, or by species recorded above single birds or low numbers of birds, is actually within the range of a site of local conservation importance (25 – 54) and hence the value and sensitivity of the assemblage of over-wintering and passage bird species is considered to be **low**.
Bats	Bat species recorded during surveys comprised: • brown long-eared (*Plecotus auritus*); • common pipistrelle (*Pipistrellus pipistrellus*); • Nathusius' pipistrelle (*Pipistrellus nathusii*); • Natterer's (*Myotis nattereri*); • soprano pipistrelle (*Pipistrellus pygmaeus*); and • whiskered / Brandt's bat (*Myotis mystacinus / brandtii*). The most recent survey data from 2014 shows that there are over 20 bat roosts in buildings within the topic study area, and that the most significant roost comprises a maternity colony of around 40 Natterer's bats. Monitoring of these roosts is continuing in 2015. The activity surveys consistently show that there are hot-spots of activity around the following locations: Cafnan Farm; Cemlyn Road; Cestyll Gardens; Cemaes community woodland; Dame Sylvia Crows Mound; Foel Fawr; The Firs Depot; Tyddyn Gele and the Visitor Centre. However, slightly higher than expected activity levels have been observed in marine interface environments, a habitat which is often assumed to be used sparingly by bats. No tree roosts have been identified although more survey work will be undertaken in 2016. Given the results of the baseline survey and the historic records of bats within the wider area the value and sensitivity of the assemblage of bats in the topic study area is considered to be **medium**.
Otter	Evidence of otter has been recorded in nine locations in the form of foraging remains or spraint. These locations include the coastal habitats, freshwater habitats at Cemyln Lagoon, the Afon Cafnan and its tributary, and the Afon Wygyr. The evidence recorded demonstrates otters are active within the catchment but suggests that the use of the topic study area is regular but very low, probably only by one or two individuals. The value and sensitivity of otter populations in the topic study area is considered to be **medium**.
Water voles	Surveys recorded evidence of the species in the form of burrows, latrines and

Ecological receptor	Results summary and value / sensitivity
	feeding remains in five separate locations within the topic study area. Most recent surveys in 2014 found that the species is now only present in three areas: the stream feeding Cemlyn Lagoon; the Cafnan Stream, and the tributary feeding Cafnan Stream near Caerdegog Isaf. Survey data show that the population of water vole within the topic study area is dynamic, but probably in decline. The value and sensitivity of the remaining water vole populations in the topic study area is considered to be **medium**.
Other mammals	Brown hare (*Lepus europaeus*), hedgehog (*Erinaceus europaeus*) and polecat (*Mustela putorius*) are all confirmed as being present within the study area. These species are deemed to have **low** value and sensitivity ratings.

There are habitats within the study area that have the potential to support several other protected mammal species. A number of species are considered to be absent from the study area due to a lack of or limited evidence and so are not included as ecological receptors:

- Badger (*Meles meles*) - There is a single record of a dead badger from 2009 on the A5025 to the south of the study area. This is the only evidence of the species ever having been present within 2.5km of the study area, Field signs in areas where they are present are also often very obvious. Setts, latrines, bedding, hairs snagged on push-throughs and paths are all features that signify that badgers are present. It is considered that should badger be present then these field signs would have been observed during the extensive daytime surveys undertaken for other species.
- Harvest mouse (*Micromys minutus*) - Harvest mouse is absent from background data searches of records within a 2.5km radius of the boundary of the study area, and was not recorded during dedicated surveys in 2010. The species has also never been recorded incidentally,
- Pine marten (*Martes martes*) - The distribution of pine marten in the UK currently shows that the species is not found on Anglesey and that the nearest populations are found in Snowdonia (The Vincent Wildlife Trust, 2015). While it is considered that there are very small fragments of woodland with the potential to support the species, the likelihood of the species crossing the Menai Strait and across the relatively open habitats of Anglesey to occupy the study area is considered remote.
- Red squirrel (*Sciurus vulgaris*) - Red squirrel is known to be present on Anglesey with records concentrated in the more densely wooded areas in the eastern and southern quarters of the island (Red Squirrels Trust Wales, 2015). However, the species requires near continuous woodland in order to survive and disperse into new areas. Ordnance Survey mapping of the island shows that there is a lack of woodland connectivity between known populations and the study area, therefore the likelihood of natural colonisation of the study area by red squirrels in the future is extremely low. However, there is one record of the species from October 2015 on Cemlyn Road (Red Squirrels Trust Wales, 2016). Further studies are therefore being undertaken in 2016.

11.2.6 Freshwater Baseline Survey Results

Macrophytes

Macrophyte cover across the freshwater survey sites was variable, with dense cover in sites that were unshaded and unaffected by poaching (trampling by livestock). However, at most sites, shading was dense, resulting in limited plant growth. A number of watercourses sampled (the Cafnan watercourse, Porth Wylfa and Porth-y-pistyll watercourse) met the Water Framework Directive criteria for 'good' or 'high ecological status' in at least one season. The Tregele and Cemlyn watercourses scored 'moderate' ecological status and below. Macrophyte species recorded across the study area were common and typical of lowland streams. There was no, or very little, algal cover at the survey sites, indicating that the watercourses are not subject to high levels of nutrient enrichment.

The value of macrophyte receptors within the study area is considered to be low due to the absence of species of conservation interest and the local scale importance of the communities present. Species present across the study area are widespread and common, typical of lowland coastal streams.

Phytobenthos

Diatom populations varied by site, season and year with all sites showing an improvement in the diatom populations over the study period due to natural changes and variation in seasonal water levels and flows. Diatoms are not considered to be of specific conservation value in themselves, however, diatoms do play a key role in the ecological function of freshwater ecosystems through the support of features of conservation value as they provide a vital food resource for invertebrate and fish species.

The value of the diatom receptor across all watercourses is considered to be negligible due to the low importance, widespread distribution and common nature of the receptor.

Invertebrates

Invertebrate survey records varied widely over the study period, ranging from one (at the National Trust pools in 2011) to 46 (at Porth Wylfa / Tre'r Gof SSSI in 2012). No Red Data Book species and no legally protected freshwater macroinvertebrate species, were recorded from any of the areas surveyed. Three Nationally Scarce species were recorded, along with two Regionally Notable species.

The value of macroinvertebrate receptors within the topic study area is considered to be low across the site due to the widespread distribution and common nature of the receptor. One near threatened species was identified at Power Station Pond and Tregele Pond respectively. As a result the macroinvertebrate receptor in Power Station Pond and Tregele Pond are considered to be of medium value for the purpose of this assessment.

Fish

Three-spined stickleback (*Gasterosteus aculeatus*), were recorded in four watercourses, and nine-spined stickleback (*Pungitius pungitius*) were recorded on the Cafnan watercourse. European eel (*Anguilla anguilla*) has been recorded at all but three survey sites and brown trout (*Salmo trutta*) has been recorded at the Cafnan waterbody. The value of fish receptors within the study area is considered to be high due to the presence of European eel across the study

area and brown trout in the Afon Cafnan. There is, however, limited habitat for these species within the upper reaches of the catchments, typically due to channel modification and low flows.

Water Quality

Dissolved oxygen levels varied between sites with a general trend of low levels in the ditch, wetland and standing water habitats as would be expected. Sites with running water all met or exceeded 'good' status based on Water Framework Directive (WFD) standards. Biochemical Oxygen Demand was also measured. With the exception of the Power Station pond, Biochemical Oxygen Demand was low across all sites, achieving 'good' WFD status.

Metal concentrations were generally low across all sites with the exception of mercury at a single site, recorded as a temporary ditch habitat. Levels of non-naturally occurring organic compounds were all below the annual average Environmental Quality Standards (EQS) given under the WFD, though levels of Di(2-ethylhexyl) phthalate exceeded the EQS value at Porth-y-pistyll and Felin Gafnan (east) in summer 2012 and at Felin Gafnan confluence and Gross Fechan in winter 2013.

Suspended solid levels varied as expected, particularly following periods of rainfall, but generally suggested a stable system with limited sediment mobilisation. Nutrient levels met at least 'good' status at all surveyed locations.

The value of the water quality receptor across all watercourses is considered to be low.

11.3 Potential Effects and Mitigation

11.3.1 Sites of Nature Conservation Importance

Each of the six statutory and non-statutory designated sites of nature conservation importance have the potential to be affected by the Project construction and operation activities. Assessment in form of EIA and HRA will therefore be required to determine likely impacts and inform appropriate mitigation strategies as required. It is considered that the baseline environmental conditions for designating ecological features of all six sites of nature conservation importance are well enough understood to inform all assessments required.

Should significant adverse effects be predicted, mitigation measures will be proposed where practicable to include sensitive timing of works, acceptable working methods and so on.

11.3.2 Terrestrial Ecology Species and Habitats

The most significant potential impacts on terrestrial and freshwater ecology are likely to occur during the construction phase. Construction phase activities such as land take, site preparation works, pre-splitting of bedrock, excavation, piling and drilling, material delivery, and soil and waste material movements and storage are likely to have an impact on some habitats and species. The key potential effects are:

- direct loss of vegetation and habitats from the Wylfa Newydd Development Area;
- injury / mortality of animal species from the Wylfa Newydd Development Area;
- damage to habitats, vegetation and foraging areas;
- habitat fragmentation;

- disturbance by noise, vibration, movement and human presence;
- habitat loss / disturbance via light pollution;
- changes to hydrology, including potential indirect adverse effects on the conservation features of statutory and non-statutory nature conservation sites;
- pollution of soils and watercourses;
- introduction or inadvertent spread of non-native, invasive species; and
- positive opportunities for enhancement of terrestrial habitats and biodiversity gain.

11.4 Proposed Scope, Methodology and Criteria

11.4.1 Study Area

Figure 11.1 shows the general extent of the terrestrial and freshwater ecology topic study area. This includes the Wylfa Newydd Development Area and a buffer zone of influence of approximately 500m, based on professional judgement and an appreciation of the location and nature of designated sites and important species and assemblages around the area.

11.4.2 Assessment Methodology and Criteria

The methodology used for the work to date is developed from the guidance set out in the NPS EN-1, which states that:

'….*where the development is subject to EIA the applicant should ensure that the Environmental Statement (ES) clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity ….'.*

NPS EN-6 provides more detail:

'…*applicants should also consider the effects of the construction of a new nuclear power station on the groundwater regime and its effects on terrestrial / coastal habitats… at the project level, baseline studies on nationally and internationally important habitats and species that may be affected as a result of the development should be undertaken by the applicant to inform the assessment of the cumulative ecological effects'*.

The baseline environmental information for terrestrial and freshwater ecology is considered to be sufficient to inform the EIA for the proposed DCO works, with the exception of the following receptors: Tre'r Gof SSSI; Cae Gwyn SSSI; Cemlyn Bay SSSI and, great crested newt.

In accordance with the guidance provided in NPS EN-6, characterisation of the wetland system at the Tre'r Gof and Cae Gwyn SSSIs, including eco-hydrological study, will be undertaken to inform the EIA and assist in determining mitigation actions necessary to maintain the quality of ecological habitat.

Some uncertainty remains as to the status of a potential great crested newt population around the Cae Gwyn SSSI. Further survey work is required to confirm this status and would be

completed prior to submission of an environmental statement, should land access issues be resolved.

Additional freshwater ecology monitoring is being carried out during 2015 to add to the data already collected, including diatom, macroinvertebrate, water quality, macrophyte and fish monitoring, as well as modelling of the current and predicted sediment influence on the gravel bar of the Cemlyn lagoon, and temperature and salinity within the lagoon. The 2015 sampling round has focused on the pond sites added during 2014 to provide a two year data set. The 2015 data is not available to be published in this report, however, it will form part of the baseline for the ES. The freshwater baseline dataset is appropriate to detect impacts from the construction and operational phases of the Project and determine suitable mitigation.

It is proposed that the scope of the EIA will focus on those designated sites, habitat and species which have been valued as **low**, **medium** or **high**. Those ecological receptor groups given a **negligible** value (fungi, bryophytes, protected plant species and diatoms) and those species where baseline surveys have concluded a likely absence from site (badger, harvest mouse, pine martin and red squirrel) will not be included within the EIA.

The assessment methodology for the DCO proposals will follow generic assessment criteria, as outlined in chapter 7, which has been developed for the EIA to provide a consistent approach across all environmental disciplines.

The DCO proposals will also be subject to a HRA in accordance with the Conservation of Habitats and Species Regulations 2010 (as amended).

Given the advanced nature of the ecology work, NRW and other stakeholders have been consulted about the approach to, and scope of, ecological surveys and assessments. This Scoping Report aims to formalise the position on the scope of the work. Consultation will be continued with NRW, North Wales Wildlife Trust, National Trust, the IACC ecologist, the RSPB, and local wildlife interest groups.

12 Radiological Issues

12.1 Introduction

Background to the regulatory regime for radiological effects

NPS EN-1 notes that various regulators play an important role in ensuring the safety, security and protection of people and the environment in relation to the design, construction, operation and decommissioning of nuclear power stations and the transport of nuclear material. The relevant regulators for the nuclear aspects of the Wylfa Newydd Project are NRW, assisted by the EA, and the ONR.

As the licensing and permitting of nuclear power stations by the nuclear regulators is a separate regulatory process, the NPS states that the Examining Authority for the DCO should act on the basis that:

- the relevant licensing and permitting regimes will be properly applied and enforced; and
- it should not duplicate the consideration of matters that are within the remit of the nuclear regulators.

The principal consenting regime for the management of radioactive wastes and the main source of information and assessment of radiological effects will be the relevant Environmental Permit (Environmental Permitting (England and Wales) Regulations 2010 as amended, SI 2010 No 675 (specifically under schedule 23)) (EP-RSR) application to Natural Resources Wales (NRW). The application must demonstrate that discharges (and disposals) of radioactive waste are minimised and that impacts on humans and the environment are minimised.

Thus, whilst the principle regulatory regimes for the management and disposal of radioactive waste are the Nuclear Site Licence and Environmental Permit, it is considered appropriate to include some high level information within this report, particularly in relation to radioactive waste and doses to human and non-human biota. This topic only relates to the main Generating Station, and will not be relevant for any Off-Site Power Station Facilities consented through the DCO or for any of the Associated Development.

The main potential radiological considerations associated with the Generating Station are doses to the public and biota which may arise during operation and decommissioning. The construction activities at the site will not generate radioactive waste or discharges and as such there is no further consideration of construction activities in this chapter.

As part of the Nuclear Safety Case for the Generating Station, Horizon will assess scenarios involving unplanned releases of radioactivity. As the likelihood of such a release is extremely low and EIA is concerned with 'likely significant effects', it is not anticipated that environmental effects of unplanned releases will be reported in the Environmental Statement accompanying the DCO application. This is consistent with the High Court's decision in R (on the application of An Taisce) v The Secretary of State for Energy and Climate Change [2014] EWCA Civ. Accidental releases are therefore not covered any further in this EIA Scoping Report and are not expected to be considered in the Stage Two Preliminary Environmental Information (PEI) Report as part of the Stage Two pre-application consultation.

Potential health effects from radiological discharges and the perception of radioactivity are discussed in more detail in the Health Impact Assessment (HIA) Progress Report and will be described further in a HIA Interim Report supporting the Stage Two Pre-Application Consultation and a finalised HIA accompanying the DCO application.

Measuring radiation

The main pathways through which humans are exposed to ionising radiation are the inhalation or ingestion of radioactive material, and via exposure to direct radiation. The potential health effects of radiation exposure are expressed in terms of dose. The unit of dose is the sievert (Sv). However, the sievert is a very large unit and typical doses from environmental exposures are expressed in milli-sievert (mSv) or micro-sievert (μSv) (1 mSv is equivalent to 1 thousandth of a sievert and 1 μSv is equivalent to 1 millionth of a sievert). For non-human organisms, radiation exposure is expressed in terms of absorbed dose, which is measured in grays (Gy).

A secondary indication of overall population exposure is 'collective dose'. Collective dose is the sum of all effective doses for a given population over a defined period of time. It is a useful way of examining the safety implications of situations where a number of different people may be exposed to radiation at a range of different levels. The unit for collective dose is the man-sievert.

12.2 Existing Environment

Public Health England's Centre for Radiation, Chemical and Environmental Hazards has calculated that the average annual dose to people in the UK from ionising radiation is approximately 2.7mSv. The radiation giving rise to these doses comes from exposure to natural and man-made sources.

Exposures to natural sources are due to the presence of naturally occurring radioactive materials (including some building materials, food and drink), and to cosmic radiation from outer space. Overall, natural radiation accounts for approximately 84% (2.25mSv) of the exposure of the UK population. However, these radiation doses vary across the UK due to the differences in indoor radon concentrations that derive from the uranium content of the underlying rock composition, leading to a variation in dose from radon inhalation. Measurements on Anglesey show that radon concentrations are relatively low over the majority of the island, but there is an area of higher radon concentrations around the south-east of the island. Annual average doses around the Wylfa Newydd Development Area are predicted to be lower than the national average as a result of the lower observed radon concentrations.

Man-made sources of ionising radiation include those used in medicine for diagnosing and treating various diseases and medical conditions. Public Health England estimates that doses from medical practices dominate an individual's exposure to man-made ionising radiation and average about 15% of overall exposure. The remaining 1% is due to exposures to man-made sources used in industry (including nuclear power generation) and from fallout from historic nuclear weapons testing and significant incidents such as the Chernobyl accident.

The radiological status of the eastern Irish Sea is influenced by discharges from the reprocessing plant at Sellafield, the fuel fabrication plant at Springfields and the existing power

stations at Heysham and Wylfa. Recent historic trends in radioactivity concentrations in seawater and biota in the area have been reported by the OSPAR[23] commission.

Routine monitoring of the local environment around the Existing Power Station has been carried out for many years by a number of bodies (including NRW and the current and former operators of the Existing Power Station), so there is a substantial body of available radionuclide data.

A 2012 assessment (Radioactivity in Food and the Environment, 2014) calculated the total dose to the most exposed members of the public from all pathways and sources of man-made environmental radioactivity in the vicinity of the Existing Power Station to be 6μSv per year. This is less than 0.3% of the Public Health England calculated average annual dose to people in the UK from ionising radiation. The most exposed people were local adults consuming marine plants and algae.

12.3 Potential Radiological issues

The nuclear regulators enforce a hierarchy of dose limits and dose constraints (a restriction on the prospective doses to individuals which may result from a defined source):

- UK dose limits - The UK dose limit for members of the public: 1mSv per annum individual effective dose from man-made (excluding medical) sources
- UK dose constraints - The Environmental Permitting (England and Wales) Regulations 2010 (Schedule 23 Part 3 S1) require the regulatory bodies to ensure that in considering granting an Environmental Permit the maximum dose for an individual from discharges from a single site should be less than 0.3mSv.

However, Public Health England has also advised the UK and Welsh Governments that a lower dose constraint not exceeding 0.15mSv/y should be applied at the design stage of new nuclear power stations and waste disposal facilities. This advice has been taken into consideration during the GDA for the UK ABWR to be deployed at the Wylfa Newydd Project in respect of prospective dose modelling.

As discussed previously, the formal assessment of radiological effects will be undertaken as part of the relevant Environmental Permit application. A qualitative discussion is provided in this section, based on professional judgement of likely issues from exposures to radioactivity and radiation resulting from normal Power Station generation and waste management operations.

As no radioactive waste or discharges will be generated as part of construction activities, these have been screened out of this assessment.

The production of radioactive discharge inventories for a number of scenarios is currently underway to support the GDA process. These inventories will then be reviewed by Horizon before being used as the basis for the radiological modelling assessments undertaken for the EP-RSR application and the Article 37 Submission for the project.

[23] OSPAR Commission – a group of representatives from 15 Governments and the European Union, the aim of which is to protect the marine environment of the North-East Atlantic

Prior to the availability of the radiological assessment modelling results, qualitative assessments have been undertaken of the possible effects from operational activities based on professional judgement. Information is available from a number of sources on likely doses resulting from operations of light-water reactors within the UK. These sources are:

- documents submitted as part of the GDA process for the UK ABWR (Hitachi, 2014);
- doses presented as part of the Radiological Effects chapter of the Environmental Statement for Hinkley Point C (EDF, 2015); and
- doses arising from operation of Sizewell B (RIFE, 2014).

From consideration of these references, it is judged that possible doses to members of the public from operational activities would be less than 20µSv/y, and as such would be judged as being of negligible effect. Dose rates to biota are judged to be lower than 10µGy/hr and so are also judged as being of negligible effect.

12.4 Proposed Scope and Assessment evolution

12.4.1 Study Area

The geographical area for the assessment of radiological impacts on members of the public will extend from the Power Station Site for as far as is necessary to take account of those members of the public in the UK, and in other EU Member States, whose behaviour and habits are likely to mean they will receive the highest individual radiological doses. These are likely to be similar to those already identified for the Existing Power Station.

If required, assessments of collective radiological doses to the public will extend to UK, European and world populations and will be integrated over a 500 year timeframe as recommended in regulatory guidance.

12.4.2 Assessment Evolution

The design of the Generating Station is still progressing and there are a number of design details that require further definition. Of particular relevance to this topic is the radiological assessment exercise being undertaken to support the EP-RSR application and Article 37 Submission, which will form the basis of the radiological effects assessment.

The generic radiological assessment process for environmental permitting applications involves:

- the definition of the study area;
- the quantification of the discharges and direct radiation;
- the identification of pathways by which radiation exposures to these discharges may occur;
- the calculation of dispersion of the discharged material via these pathways and of resulting radioactivity concentrations in relevant environmental material;
- the identification of exposed groups and species and their characterisation in terms of habits and consumption rates; and
- the calculation of doses resulting from potential exposures.

12.4.3 Next steps

As the design progresses from the generic UK ABWR design assessed in GDA, through to specific implementation proposed at the Generating Station, the application of BAT will be embedded within the design process to minimise discharges and the radiological effect of discharges.

As the GDA process progresses, the proposed radiological discharge inventories for the Generating Station will be produced for normal discharges. These will be reviewed by Horizon for their application to assessments. This will allow the radiological assessments of dose to be completed for the EP-RSR application and the Article 37 Submission.

An assessment will be undertaken of the radiological consequences of the transport and storage of radioactive waste at the Generating Station Site, to demonstrate compliance with the regulatory requirements.

Prior to the commissioning of the Generating Station, an environmental monitoring programme will be designed and implemented. The results of this exercise will provide a baseline against which to measure the potential effects of the discharges of radioactive wastes from the Generating Station once it is operational. The sample locations and media sampled (e.g. direct dose rate measurement, sampling of local crops, local milk and dairy produce, fish and shellfish) will be selected to reflect the significant exposure pathways identified in the radiological dose modelling and assessment exercise.

13 Soils and Geology

13.1 Introduction

This chapter provides an assessment of the potential effects on soils and geology associated with the proposed activities within the Wylfa Neywdd Development Area. The term soils and geology covers soil quality, historical land contamination present, sites of geological importance and geological resources including soils and mineral reserves. The Proposed Activities have the potential to disturb any historical land contamination present, with potential consequential effects on human health and / or the wider environment. Similarly, the soil and geological characteristics will fundamentally influence the fate and transport of accidental future land pollution resulting from construction, operation and / or decommissioning of the Power Station and Proposed Activities.

The geological context of the site will also influence its ecology, hydrogeology[24] and hydrology to varying degrees and these associated topics are assessed in Chapters 11 and 14 respectively.

13.2 Existing Environment

Information used in preparing the baseline for soils and geology has been obtained from a number of sources including available data, information provided via technical consultants and from technical reports.

13.2.1 Topsoil and other Recent Soils

The Wylfa Newydd Development Area is comprised of 'freely draining, slightly acid, loamy soils' of low fertility. Loamy soils are composed of a mixture of sand, clay, silt and organic matter. In the south of the Wylfa Newydd Development Area, soils are described as 'slowly permeable' and are seasonally wet, rather than freely draining. These soils have a moderate potential to transmit pollutants. Land use on the soils typically comprises pastures, woodlands and grasslands. There is a significant thickness of peat within the Tre'r Gof SSSI.

An Agricultural Land Classification survey undertaken in 2015 identified that most of the soils within the Wylfa Newydd Development Area are Subgrade 3b (moderate quality), with a large area of Grade 5 (very poor quality) and small areas of Subgrade 3b (moderate quality) with areas of Grade 5 (very poor quality) and smaller areas of Subgrade 3a (good quality) and Grade 2 (very good quality). Subgrade 3a and Grade 2 soils are classified as 'Best and Most Versatile' agricultural soils; this is the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops. The location and extent of the different Agricultural Land Classification Grades are shown in figure 13.1.

[24] The study of groundwater, with particular emphasis on its chemistry, mode of movement and relation to the geologic environment

Figure 13.1: Agricultural Land Classification survey results Artificial Geology (Made Ground)

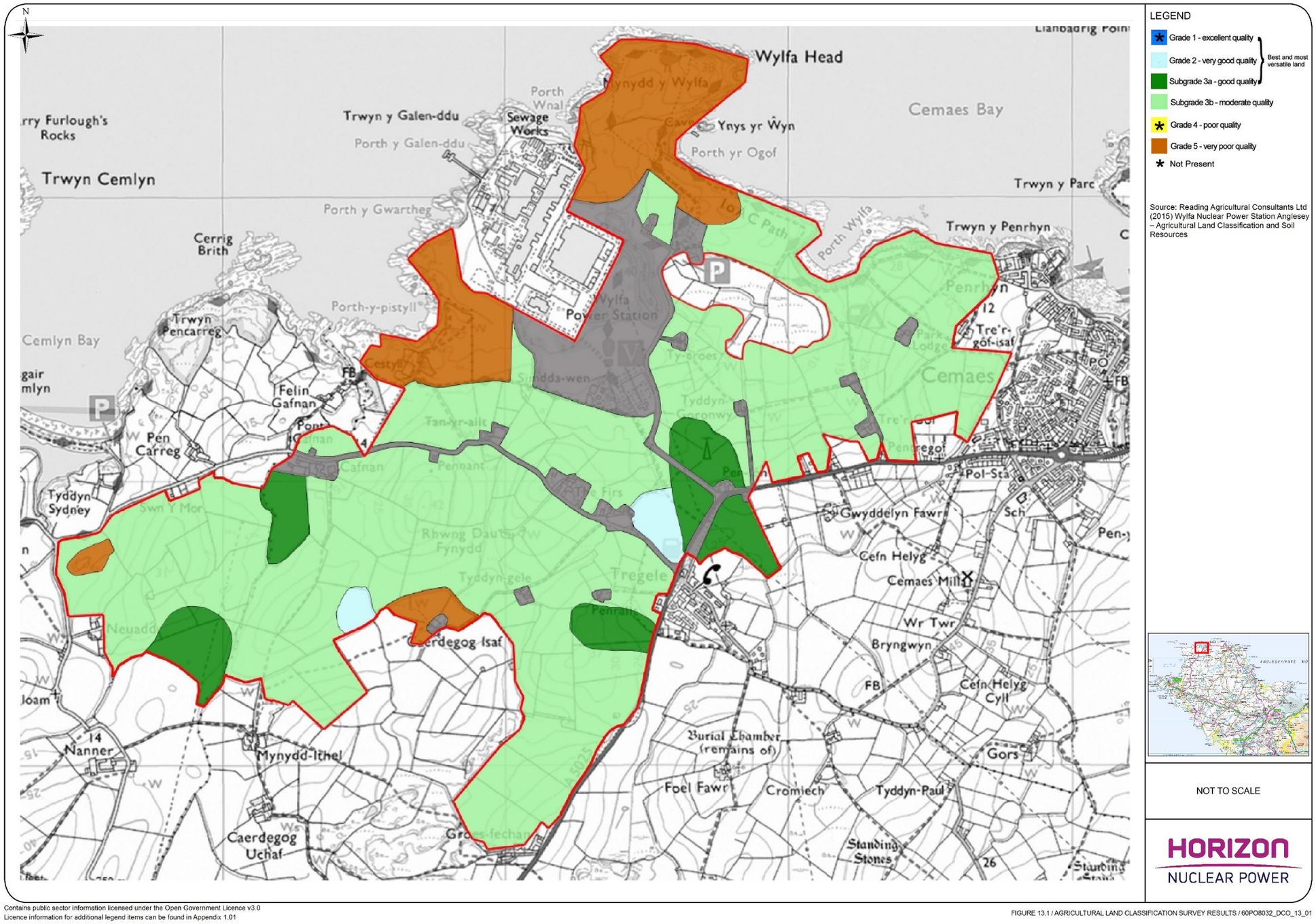

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FIGURE 13.1 / AGRICULTURAL LAND CLASSIFICATION SURVEY RESULTS / 60PO8032_DCO_13_01

The majority of the Wylfa Newydd Development Area is essentially undeveloped and therefore artificial geology (made ground or in-filled ground) is largely absent. There are, however, localised areas of made ground that which are associated with the construction of the Existing Power Station. Other areas of made ground are to be associated with existing development including road construction, associated development of the Existing Power Station and isolated residential properties

Where encountered, made ground has typically been described as sandy gravel or clayey sandy gravel with cobble and (more rarely) boulder content. Anthropogenic material identified as waste including metal, plastic, bricks, wood glass and asbestos containing materials, has been found in areas of made ground, predominantly to the south of Existing Power Station. On-going ground investigations include field and chemical analysis of made ground samples from areas of potential concern.

13.2.2 Superficial Geology

According to British Geological Survey mapping, the superficial geology underlying the Wylfa Newydd Development Area comprises Glacial Till ('boulder clay') deposited during the last major glaciation phase 14,000 to 24,000 years ago (the Late Devensian). During this glaciation an ice sheet advanced across Anglesey from the north causing the deposition of drumlins from both local and non-local geological material.

After the ice sheet retreated at the end of the glaciation period, wind-blown sediments were deposited and subsequently re-worked by permafrost weathering and erosion. Valleys and topographical depressions were in-filled by glacio-lacustrine sediments (mainly laminated silts and clays). Although not subject to extensive ground investigation, the alluvium and peat deposits encountered within the Tre'r Gof SSSI are thought to be underlain by a deep sequence of such glacio-lacustrine and lacustrine sediments

13.2.3 Bedrock Geology

The bedrock geology underlying the majority of the study area and the entire development platform comprises metamorphic rocks of the New Harbour Group. The bedrock geology underlying the areas north and north east of the Existing Power Station comprise the Gwna Group which spans from the late Precambrian to early Cambrian.

The south western and southern 250m boundary surrounding the Wylfa Newydd Development Area is underlain by the Skerries Group, the age of which is still under debate and has recently become part of the New Harbour Group (See Figure 13.2). The Skerries Group is characterised by widely deformed and metamorphosed bedded successions of pebbly sandstones, conglomerates and basalts.

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Figure 13.2: Published bedrock geology (BGS, 2015b)

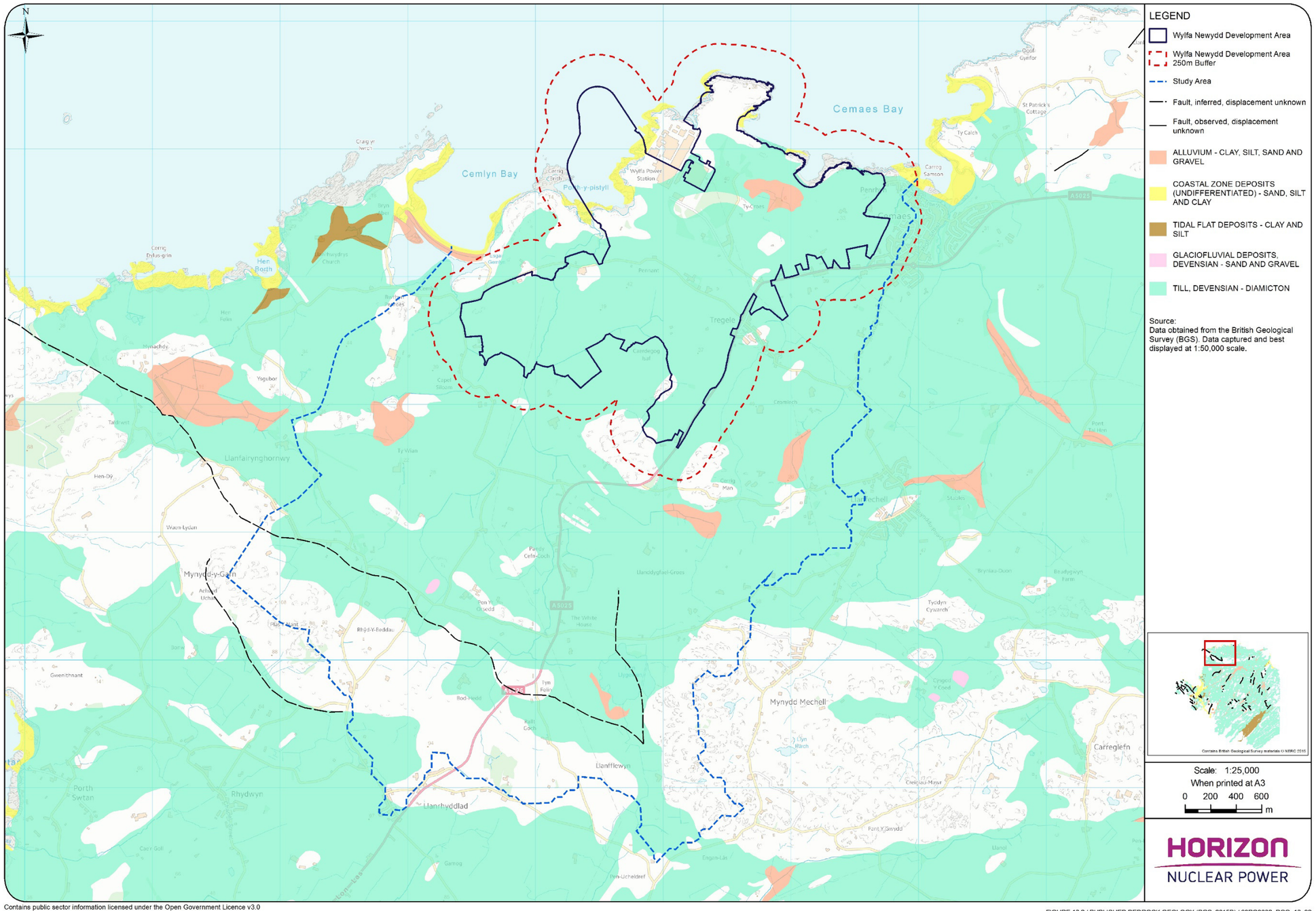

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FIGURE 13.2 / PUBLISHED BEDROCK GEOLOGY (BGS, 2015B) / 60PO8032_DCO_13_02

Tectonic activity has also resulted in the formation of a series of faults within the bedrock which may affect ground stability and act as groundwater flow pathways. These intrusions and faults have both been mapped with generally either an east to west or north-west to south-east trend.

13.2.4 Designated Sites

Anglesey has been awarded European Geopark Network status due to the numerous Sites of Geological Importance and the outstanding geodiversity and geological heritage. The Anglesey Geopark (called the GeoMôn Geopark) covers the 720 km^2 of the Isle of Anglesey and has approximately 200 km of coastline. The GeoMôn Geopark was designated as a UNESCO Geopark in autumn 2015.

Regionally Important Geodiversity Sites (RIGS) are locally listed sites of local, regional, and national importance for their geodiversity. RIGS are conserved and protected from development by local authorities. There are four RIGS located within the study area as detailed in table 13.1 and figure 13.3.:

Table 13.1 The RIGS within the vicinity of the Wylfa Newydd Development Area

RIGS	Importance	Location relative to Wylfa Newydd Development Area
Porth Wnal Dolerite	A tertiary mafic dyke important for enhancing knowledge of plate tectonics and modern day earthquakes	At the northern extent of the Wylfa Newydd Development Area
Porth Wnal Granite	Important for demonstrating relationships and relevant timing of igneous, tectonic and sedimentary events in Anglesey	Immediately north of the Wylfa Newydd Development Area, Partially overlaps with the Porth Wnal Dolerite RIGS.
Cemaes Bay	It has international significance as the type section (best example) for the Gwna mélange	An educational trail running along two sections of the coastal path to the east of the Wylfa Newydd Development Area.
Trwyn y Penrhyn (Cemaes Bay)	Important for the understanding of igneous dykes injected into the Gwna mélange and Precambrian stromatolitic limestones	Lies within Cemaes Bay RIGS to the east of the Wylfa Newydd Development Area but has been designated separately.

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Figure 13.3: Location of RIGS close to Wylfa Newydd Development Area

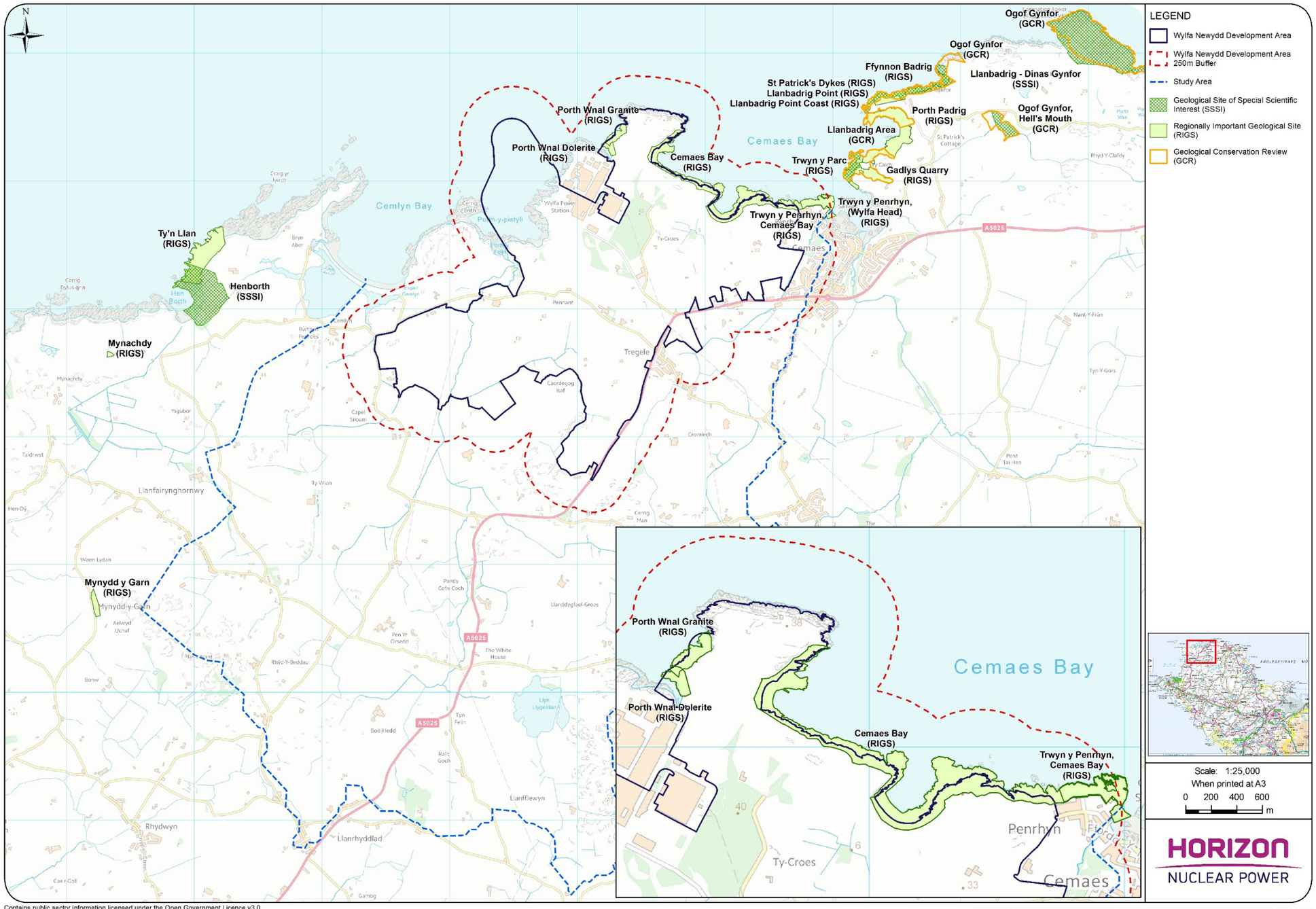

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FIGURE 13.3 / LOCATION OF RIGS CLOSE TO WYLFA NEWYDD DEVELOPMENT AREA / 60PO8032_DCO_13_03

13.2.5 Mineral Reserves

Category 2 Aggregate Safeguarding Areas contain resources considered to be of local or regional importance. There are four Category 2 Mineral Reserves within the Wylfa Newydd Development Area. These reserves are at Porth-y-pistyll and Wylfa Head (both Igneous),, Wylfa Head (Quartzitic sandstone), and Tre'r Gof SSSI (Sand and gravel).

13.2.6 Land contamination

A number of Areas of Potential Concern have been identified within the Wylfa Newydd Development Area. Significant concentrations of trichloroethylene contamination have been identified within an underground chamber ('sump' or culvert) to the south of the Existing Power Station. Laboratory chemical sampling of water from the culvert suggests that it may be acting as a contamination pathway.

Asbestos has been identified to the south west of the Existing Power Station in made ground typically comprising waste materials. Hydrocarbon contamination has also observed in this location during previous stages of investigation. Free-phase hydrocarbons have been encountered to the north east of the Existing Power Station where elevated concentrations of mercury, manganese, hydrocarbons and bis (2-ethylhexyl) phthalate (DEHP) were recorded in the groundwater.

Initial studies identified ground gas to be a potential low to moderate risk at the Wylfa Newydd Development Area). The majority of the current monitoring installations are located within the bedrock stratum, and a small number located within the superficial deposits.

Potential sources of contamination have been identified across the study area (see figure 13.4). These include quarries, filled quarries, chemical works and sewage works.

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Figure 13.4: Contamination plan

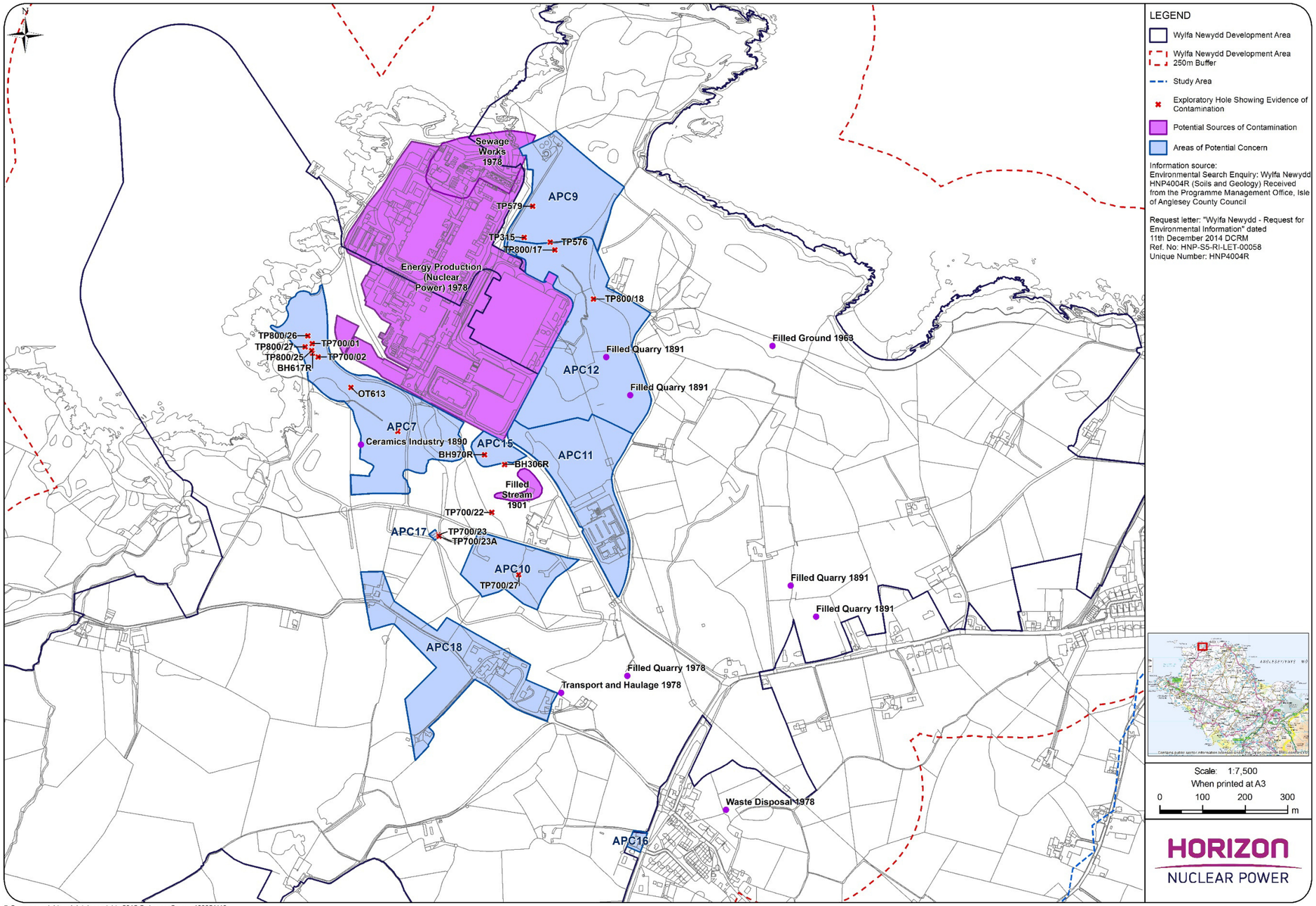

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FIGURE 13.5 / CONTAMINATION PLAN / 60PO8032_DCO_13_05

13.3 Potential Effects and Mitigation

Potential effects on soils and geology associated with the Proposed Activities during the construction, operation and decommissioning phases are listed below.

- Physical and chemical changes to soil quality and changes to drainage during the construction of the Power Station - Proposed Activities which may generate these potential effects include the demolition of buildings, including utility diversions; the onshore clearance, site levelling and earthworks; equipment storage and laydown; commissioning activities; and operation of construction machinery and equipment. Changes in soil quality may also occur due to the presence and operation of the Power Station.
- Mobilisation of pre-existing contamination and spread of contamination during construction of the Power Station due to the demolition of buildings including utility diversions, and the onshore clearance, site levelling and earthworks;
- Sterilisation of soil and/or geological resources and disturbance of sites of geological importance during construction of the Power Station. Proposed Activities which may generate these potential effects include: the demolition of buildings, including utility diversions; the onshore clearance, site levelling and earthworks; and the construction of built infrastructure onshore.
- Generation of fugitive dust and sediment during construction of the Power Station due to the demolition of buildings, onshore clearance, site levelling and earthworks and operation of construction machinery and equipment;
- Ground instability due to dewatering activities and offshore blasting, dredging, tunnelling and piling during the construction of the Power Station;
- Excavated materials arising requiring disposal or producing geological resources during construction of the Power Station.

Embedded mitigation measures that will be employed as part of the construction phase of the Project will incorporate best practice working methods. A Materials Management Plan will be developed and implemented to optimise re-use of suitable material. Implementation of an Environmental Management Plan and the adoption of an appropriate remediation strategy will mitigate the risks from contamination. The remaining waste will be managed according to a Site Waste Management Plan.

13.4 Proposed Scope, Methodology and Criteria

The methodology which has been followed for the work undertaken to date, and which will be developed during the EIA process, builds on the guidance set out in the NPS EN-1. NPS EN-1 specifies that the potential impacts on designated sites of geological importance (paragraph 5.3.13) and mineral resources (paragraph 5.10.9) should be considered and that opportunities should be identified to conserve and enhance geological conservation interest (paragraph 5.3.7).

Paragraph 5.10.8 of NPS EN-1 states that that applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the

Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5).

The following statement within the NPS EN-6 is relevant to the assessment of potential effects of the development of the Wylfa Newydd Project on soils and geology:

"The contamination of soils and water resources can be mitigated through the EIA process and managed through the possible implementation of Environmental Management Plans." (paragraph 3.7.8).

Desk-based work has included the review of literature sources, publically available information and previous ground investigation and site assessment reports. More detailed onshore and offshore ground investigations are being undertaken to further inform the assessment of potential effects on soils and geology.

Specific methodologies which will be used to assess the different types of potential effects are described in more detail in the 'Assessment Methodology' section below (section 13.4.2).

13.4.1 Study Area

The initial topic study area was defined by potential environmental receptors within 2km ('upstream') of the southern side of the Power Station Site, and within 1km of its eastern and western boundaries, with the northern boundary defined by the Irish Sea coastline.

As additional baseline information was obtained, the study area boundary was refined and altered to reflect key features of importance to soils and geology, while at the same time acknowledging the inter-relationship between the geological, hydrogeological and hydrological settings. The revised soils and geology study area is shown on figure 13.5 as a blue dashed line.

Figure 13.5 Soils and geology study area

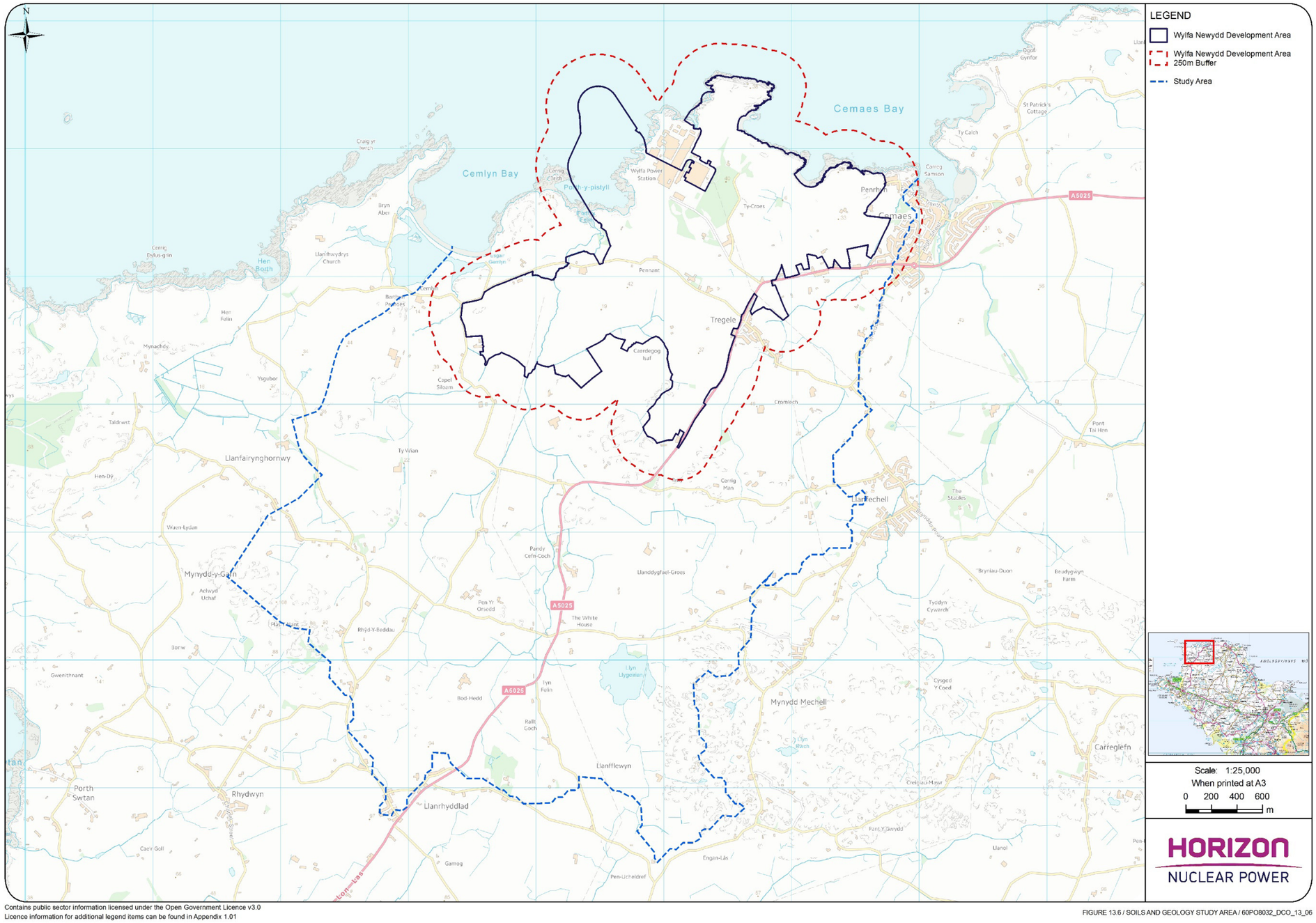

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FIGURE 13.6 / SOILS AND GEOLOGY STUDY AREA / 60PO8032_DCO_13_06

However, the majority of potential effects on soils and geological receptors are considered likely to be associated with direct disturbance of ground conditions within the Wylfa Newydd Development Area. As such, the revision to the initial study area for hydrological purposes does not materially affect the assessment of the likely effects on contamination or soils. A 250m buffer around the Wylfa Newydd Development Area has been used for the likely effects on contamination or soils.

13.4.2 Assessment Methodology

The assessment of effects on soils and geology will be in accordance with best practice guidance including:

- Establishing the current geological characteristics of the Wylfa Newydd Development Area and its surrounding environs. These characteristics will represent the baselineconditions' against which the magnitude of likely effects will be assessed;
- Identifying potential direct impact on the baseline conditions and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects at all stages of the Proposed Activities;
- Assessing the significance of any identified impact on the baseline conditions, taking into account both its potential magnitude and likelihood of the effect and the importance and / or sensitivity of the receptor;
- Considering the cumulative effects of the assessed potential effects on soils and geology receptors when aggregated and / or sequenced with effects relevant to other environmental receptors;
- Identifying mitigation measures required to reduce or eliminate potentially negative effects (taking potential cumulative effects into account);
- Identifying opportunities to enhance the baseline conditions through implementation of the Proposed Activities (e.g. increasing the utility of geological resources, increasing public access to sites of geological significance and interest); and
- Assessing the significance of any residual effects (and cumulative effects) following implementation of the proposed mitigation measures and / or enhancement opportunities.

The order of magnitude and sensitivity of specific soil and geology criteria will be assessed. This will allow a study of the significance of their effect. The criteria will be in relation to the following receptors:

- soil quality;
- receptors of contamination;
- geology and Sites of Geological Importance;
- geological resources.

The soils and geology impact assessment process will be iterative, whereby mitigation measures identified as required in early assessments will be incorporated into the design of the Proposed Activities and inform the appropriate environmental management plan during construction, reducing the potential for significant impacts.

13.4.3 Assessment Criteria

Consideration has been given to the assessment criteria presented in the Draft IACC EIA document '*Approach and Methodology for Environmental and Cumulative Impact Assessment'* (IACC, 2014) with modifications made where appropriate to make them applicable to the assessment of the proposals. Effects will be considered against a 'Do Nothing' approach (i.e. compared to the baseline conditions). Specific assessment criteria determining the magnitude of change and the sensitivity of the receptors will be developed for soils and geology assessment based on the principles as defined in chapter 7 Approach to EIA.

14 Surface Water and Groundwater

14.1 Introduction

This chapter describes the current environmental baseline for surface water and groundwater and the potential impacts associated with the proposed activities within the Wylfa Newydd Development Area (Proposed Activities). It includes information regarding: water quality (freshwater), hydrology, hydrogeology, fluvial geomorphology[25] (including hydromorphology[26]), flood risk assessment and an assessment appropriate to the Water Framework Directive (WFD).

The Proposed Activities have the potential to affect the flow and quality of water across the Wylfa Newydd Development Area, including flood risks posed to the Wylfa Newydd Development as well as changes to flood risk arising from construction activities and the development.

Coastal processes and coastal geomorphology are discussed in chapter 15 and the marine environment is discussed in chapter 16.

14.2 Existing Environment

Information used in preparing the baseline for surface water and groundwater has been obtained from a number of sources including publically available data, technical reports, monitoring, and surveys. Data collection is ongoing.

14.2.1 Rainfall

The UK Meteorological Office average annual rainfall data available online (UK Met office, 2015) for the period 1981 to 2010, shows an average annual rainfall at Cemaes of 841mm/year. This is below the UK average of 1154mm/yr. Long term data indicates rainfall is typically higher in the late autumn and early winter and lowest in late spring and early summer.

14.2.2 Groundwater

Groundwater is found in both superficial deposits and in discontinuities such as fractures in the underlying bedrock. Over most of the Wylfa Newydd Development Area groundwater appears to form a continuous body with the water in the bedrock interacting with the water in the superficial deposits. However, there are areas where this is not the case and groundwater in superficial deposits is isolated from that in the bedrock.

The EA, which had responsibility for this aquifer categorisation prior to the formation of NRW, categorised the bedrock in the Wylfa Newydd Development Area as a Secondary B aquifer[27]. These aquifers are predominantly lower permeability layers which may store and yield limited

[25] The study of landforms and the processes that create them in relation to rivers.

[26] An interdisciplinary science that focuses on the interaction of water with the surrounding landforms and sediment processes.

[27] Environment Agency (2009) What's in your backyard [http://apps.environment-agency.gov.uk/wiyby/default.aspx] [Accessed July 2015]

amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

The superficial deposits across the majority of the Wylfa Newydd Development Area are defined by the EA as Unproductive Strata. Unproductive Strata are deposits with low permeability that have negligible significance for water supply or river base flow and it is unlikely that there will be any significant groundwater flow within them. The exception is at Tre'r Gof SSSI where the superficial deposits are identified as a Secondary A Aquifer. A Secondary A aquifer is described by the EA as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers*". It is likely this aquifer unit is very important to the functioning of the Tre'r Gof SSSI.

The Wylfa Newydd Development Area lies within the Ynys Môn Minor water body unit (GB41002G204400), which covers a large part of Anglesey. This area was designated in 2009 as being of "Good" quantitative status (that is there are no significant pressures on groundwater resources with, for example, sufficient water to support stream flows and groundwater inputs to terrestrial ecosystems) and 'Poor' quality status due primarily to the effects of past mining on Anglesey.

The Wylfa Newydd Development Area is located is in an area that is currently exempt from groundwater abstraction licensing and so NRW does not hold any information regarding licensed abstractions. However, the IACC holds information of private water supplies and they have provided Horizon with information on current and historical supplies in and around the Wylfa Newydd Development Area. This information has been reviewed and three private water supplies were identified within the inner hydrogeology study area: Foel Fawr, Caerdegog Uchaf and Cae Gwyn. Foel Fawr has been sampled for chemical analysis. Access to Caerdegog Uchaf and Cae Gwyn has not been granted and these PWSs have not been sampled to date. These two properties are towards the edge of the inner study area and up hydraulic gradient of the development. As such, it is unlikely that they would be affected.

Water level information collected from boreholes across the study area has been used to determine groundwater flow directions. Beneath the Wylfa Newydd Development Area the groundwater flows towards the coast in a generally westerly and north-westerly direction, from the higher ground in the east of the study area to discharge to the sea. A groundwater divide is apparent to the east of Tre'r Gof SSSI such that to the east of the divide the groundwater flow direction is more to the north and northeast.

Baseline groundwater quality has been compared to appropriate water quality standards which indicate the water to generally be of good quality. However, manganese and iron concentrations do exceed the standards in several boreholes and in a small number of boreholes there are exceedances of standards for nitrate, ammoniacal nitrogen and certain metals. Low level contamination by organic compounds is identified in two locations likely to be due to historical activities associated with the Existing Power Station.

14.2.3 Surface Water and Fluvial Geomorphology

The Wylfa Newydd Development Area is located within the Ynys Môn Catchment Abstraction Management Strategy (CAMS), part of the Western Wales River Basin District, prepared under the WFD. The study area consists of five small surface water catchments, listed in table 14.1,

in addition to a number of small ponds isolated from the small watercourses. The Existing Power Station is drained by three surface water drainage systems and there are some small coastal areas not drained by the five main catchments as shown. Table 14.1 also details those catchments that are defined as WFD bodies and their current status.

Table 14.1 Surface water catchments within and around the surface water study area.

Catchment Name[1]	Catchment Area (km^2)	Description	WFD Designation	WFD Status
Tre'r Gof Catchment	1	Drains northwards to the Tre'r Gof SSSI. The Tre' Gof basin drains to the coast via a culvert and outfall at Porth Wylfa.	Not defined	
Afon Cafnan Catchment	10	Catchment is to the south and west of the Wylfa Newydd Development Area, discharging to the sea at Port-y-pistyll. Includes Cae Gwyn SSSI, which drains via a small channel.	Un-named - Wygyr catchment (6)' (water body ID GB110102059160)	Moderate ecological status, not defined as a high modified water body
Cemaes Catchment	3	Catchment to the east of the Wylfa Newydd Development Area. Drains north from Llanfechell discharging into Cemaes Bay.	Not defined	
Power Station Catchment	0.3	Immediately south of the Existing Power Station flowing westward and discharging to the coast at Porth-y-pistyll. The upper reaches of the catchment are culverted.	Not defined	
Cemlyn Catchment	2	Towards the south west of the study area. Drains via an unnamed watercourse into Cemlyn Bay.	Un-named - Wygyr catchment (5)' (water body ID GB110102059150)	Moderate ecological status, not defined as a high modified water body

Notes:1 catchment name as used in this study

The smaller watercourses within the study area can be typically be described as drainage ditches forming the boundaries of the adjacent agricultural land and draining into the larger watercourses and WFD water bodies. The smaller watercourses or drains flow through a predominantly rural catchment with few settlements and although not defined on maps as water bodies, they are a fundamental part of the water body catchments/drainage networks.

Water quality information collected to date indicates that aside from minor issues outlined below there is no significant variation in the water quality observed across the study area and little or no significant pollution. Those substances that exceed water quality standards include manganese which has concentrations in excess of the non-statutory annual average EQS at all locations where data was obtained except one. It is understood that these concentrations naturally occur as a result of the geology. In addition, trichloroethylene has been detected near Porth-y-pistyll but is below the EQS and is associated with a historical spill with the Existing Power Station site.

14.2.4 Fluvial Geomorphology

The fluvial geomorphology baseline has been informed by a desk study and geomorphological reconnaissance survey of the watercourses identified within the 1km fluvial geomorphology study area.

The two main watercourses, the Afon Cafnan and Cemlyn Stream WFD water body (GB110102059150), are currently classified as WFD water bodies. Both watercourses showed some evidence of channel adjustments within the existing banks. The watercourses have been assessed to be low to moderate energy water bodies, indicating a limited ability to shift channel course. A tributary of the Afon Cafnan called Caerdegog Isaf was also observed to have some limited geomorphological features present; with a substrate of gravels in some locations. These three features are all considered to have a Medium value with respect to fluvial geomorphology.

Five other watercourses have been assessed as part of the fluvial geomorphology baseline. The smaller watercourses within the geomorphology study area are typically drainage ditches forming the boundaries of adjacent agricultural land and draining into the larger watercourses and WFD water bodies. The watercourses were predominantly observed to be modified realigned channels, with little vegetated riparian corridors and silt substrate. These features were assessed to have a low value with respect to fluvial geomorphology.

The site-based assessment of the watercourses is on-going and baseline information on some of the other watercourses, as well as an update of the watercourses detailed, will be available following further surveys in 2016.

14.2.5 Flood Risk

The UK Meteorological Office average annual rainfall data available online (UK Met office, 2015) for the period 1981 to 2010, shows an average annual rainfall at Cemaes of 841mm/year - this is below the UK average of 1154mm/yr. Long term data indicates rainfall is typically higher in the late autumn / early winter and lowest in late spring / early summer.

The Welsh Government's TAN 15 defines three development advice zones relating to flood risk:

- Zone A – considered to be little or no risk of fluvial or tidal/coastal flooding;
- Zone B – areas known to have been flooded in the past; and
- Zone C1 – an annual probability of flooding from tidal and fluvial sources greater than 0.1%, however served by significant infrastructure;
- Zone C2 - An annual probability of flooding from tidal and fluvial sources greater than 0.1%, and without significant flood defence infrastructure.

The TAN 15 Development Advice Map issued by the Welsh Government indicates that the Power Station Site and surrounding area is predominantly considered to be at little or no risk of fluvial or tidal / coastal flooding. The areas across the study area that are considered to be at risk of fluvial /tidal flooding are isolated to:

- low lying areas inland of Porth-y-pistyll where extreme sea levels result in inland flooding. These areas are defined in TAN 15 as Zone C2 which is an area where there is an annual probability of flooding from tidal and fluvial sources greater than 0.1% and where there is no significant flood defence infrastructure;
- along the main Afon Cafnan channel southwards to Ty-croes, and along the downstream end of the Caerdegog Isaf stream (which is tributary to the Afon Cafnan), where areas within fluvial Flood Zone C2 are shown; and
- five low lying marshy areas in the study area, including one inland of Porth Wylfa associated with Tre'r Gof SSSI, that are shown to be within TAN 15 Zone B, i.e. areas known to have been flooded in the past.

14.2.6 Baseline combined fluvial and surface water flooding

The TAN 15 methodology has been followed to provide a preliminary flood consequences assessment (FCA), which has been supported by modelling to predict the potential for flooding under various scenarios. The FCA will be updated as more information becomes available. A variety of potential flood sources have been considered including tidal, fluvial and pluvial, groundwater, services and reservoirs and the effects of hardstanding and structures such as bridges and culverts have all been assessed.

The main areas at risk of fluvial/pluvial flooding have been derived using broad scale 2D modelling of the catchments in the study area. The combined fluvial and surface water flooding areas that are predicted within the Wylfa Newydd Development Area in each surface water catchment are summarised below.

I. Tre'r Gof Catchment – this small catchment is dominated by surface water flows to Tre'r Gof. The deepest flooding across the Wylfa Newydd Development Area is within the Tre'r Gof SSSI which is formed in a natural depression into which the surface run-off flows. There is additionally another small area of flooding indicated on a southern drain to Tre'r Gof.

II. Afon Cafnan Catchment – flooding is predicted along the southern edge of the Power Station site boundary associated with the Caerdegog Isaf tributary. There is also some flooding predicted to depths of up to 0.75m along Afon Cafnan to the south (upstream) of the Cemlyn Bay Road. Ponding is possible within the indicative platform area, to the south of the road between Tregele and Pennant, this drains south to Caerdegog Isaf.

III. Cemaes Catchment – dominated by fluvial flows. Deep flooding (1.5m) is predicted to occur in a small portion of the Wylfa Newydd Development Area to the north east of Tregele. The floodplain further downstream adjacent to Cemaes is confined and doesn't extend onto the Wylfa Newydd Development Area or impact significantly on the village.

IV. Power Station Catchment – this small catchment is dominated by surface water flows. Two flood flow routes are predicted within the Existing Power Station and each are well defined and generally shallow. An area of ponding is predicted to the north east of the

Power Station, immediately south of the road to the Existing Power Station. Water appears to flow along the road and collect here, before flowing across the indicative platform area towards the coast at Porth-y-pistyll.

V. Cemlyn Catchment – this catchment is dominated by fluvial flows. The flood extent is predicted to be more significant in the lower reaches, with deep flooding to the north and along Cemlyn Bay Road. There is also flooding predicted along the road to Cemlyn Bay car park. However, this is a separate catchment to Cemlyn Stream.

The model has also been run to provide an assessment of the potential for flooding of the operational site taking into account climate change, maximum tidal surges and plausible wave levels. This predicts a flood level of 13.3m AOD for the maximum tidal and wave level for up to the 0.01% Annual Exceedance Probability (AEP) flood event. The majority of the Wylfa Newydd Power Station and all supporting buildings will be sited at above 14m AOD and as such there is no reasonably foreseeable flood risk to the Power Station site from coastal flooding for up to the 0.01% AEP flood event. The greatest potential for overtopping (by combined extreme sea levels and wave action) is in the area inland from Porth Wylfa. If wave overtopping were to occur here it is assumed the water would flood Tre'r Gof and be contained within the topographic depression in which it sits. Tre'r Gof is surrounded by higher ground; this combined with the limited duration and rate of overtopping means it is unlikely that there would be further ingress of tidal flooding towards the Wylfa Newydd Development Area.

It is unlikely shallow groundwater will occur in great enough quantities to generate significant groundwater flooding even when rainfall is high, because of the low storage and low transmissivity in the aquifer systems. However, consideration will need to be given to the potential impact of high groundwater levels on surface water dissipation and the duration of surface water flooding, especially in relation to any levelling works and excavations

There are unlikely to be any impacts associated with sewers or water mains due to the locations and size of these in the area and as there are no reservoirs in the vicinity, there is no requirement to consider these further.

14.3 Potential Effects and Mitigation

Potential effects associated with the Proposed Activities during the construction, operation and decommissioning phases are listed below.

- potential spills and leaks of fuel/oil from construction machinery and operational plant affecting surface water and groundwater quality. During construction, release of sediments from works and cementitious pollution from use of cementitious materials resulting in potential derogation of surface water quality.Percolation of water through mounds could mobilise existing ground contamination resulting in changes to groundwater quality.
- potential for sediment laden inflow from mounds and run off from areas of bare earth resulting in derogation of surface water quality and localised flooding. During construction, fine sediment entering watercourses may alter flow regime and stream morphology through deposition. During the operational phase the increase in impermeable surface area could also increase fine sediment entering water courses

- changes to existing surface water flows during the construction phases. This includes the installation of drainage, the use of cofferdams or diversions for the installation of culverts for the installation of construction site boundary fences and diversion of PRoW during construction of the Generating Station.
- loss of natural catchment and changes to hydrological pathways through drainage implementation. Alteration of catchment areas and altering base flow from groundwater due to mounding and increased slopes.
- changes to surface water flow patterns leading to increased surface water and fluvial flooding during the site preparation and clearance phase;
- changes to groundwater flow direction caused by either temporary or permanent groundwater dewatering activities. Dewatering of excavations lowering groundwater level and resulting in loss of groundwater base flow to watercourses and springs;
- changes to sediment and flow regimes due to the use of cofferdams, creation of mounds and diversion, removal or realignment of watercourses;
- destabilisation of watercourse banks due to vegetation and topsoil clearance, encouraging lateral erosion;
- increased extent of channel modification due to the construction of outfalls/proposed discharge points to the watercourses;
- in-channel works including removal of natural bed, bank and riparian zone for culvert construction or bridge installation on watercourse crossings, leading to the loss of in-channel morphology and habitat
- changes to the groundwater recharge rate resulting in changes in the groundwater flow direction and associated groundwater discharge points;
- compaction of soils in areas where top soil have been removed increasing surface water runoff causing increased flood risk. This compaction and changes to catchment areas may also affect changes to the groundwater recharge rate.
- blockage of existing drainage pathways or culverts during construction causing localised flooding; Construction of bridges or culverts in the floodplain altering flood regime and increasing risk of flooding.increase in impermeable or low permeability areas altering the runoff regime causing increased flood risk. Conversely, where temporary buildings are removed the area of hard standing will be reduced; and
- flooding due to water mains bursting or failure of the permanent drainage system.
- construction drainage would decrease the catchment reducing water availability within the Tre'r Gof SSSI, potentially affecting water quality and aquatic ecosystems. Mounding also has the potential to affect Tr'e Gof SSSI by altering connectivity of its drains, changing sediment and flow regime.

Mitigation measures will be considered throughout the design of the Generating Station, including installation of drainage and watercourse realignment. Embedded mitigation measures that will be employed as part of the construction phase of the project will incorporate standard best practice working methods and will include sediment control measures, timing in channel works to coincide with low flow conditions, installation of silt fencing, and the incorporation of buffer zones.

The development and implementation of an Environmental Management Plan will take account of best practice methods. An Emergency and Incident Response Plan as part of the

Environmental Management Plan will reduce the impact of spills or leaks. A programme of groundwater level and quality monitoring of key receptors will ensure that the mitigation is effective and that no significant decline in WFD status occurs.

14.4 Proposed Scope, Methodology and Criteria

The methodology that has been followed for the work undertaken to date builds on the guidance set out in the NPS EN-1 and NPS EN-6. EN-1 states that *'….where the development is subject to EIA the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity ….*'. EN-1 also requires applications to include an assessment of the impacts on coastal processes and geomorphology, marine ecology, biodiversity and protected sites, water quality and also an assessment of the vulnerability of the proposed development to coastal change. EN-1 also requires applicants to show how the Project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.

Owing to the coastal and estuarine location of the nuclear sites the NPS EN-6 also goes on to state the requirement for the applicant to take account of climate change adaptation measures; assess specific implications of cooling water characteristics for the marine environment; assess the impacts on coastal processes, intertidal deposition and soil development; and take into account the effects on the groundwater regime and its effects on terrestrial and coastal habitats. Section 3.9 of EN-6 goes on to state *"…baseline studies on nationally and internationally important habitats and species that may be affected as a result of the development should be undertaken by the applicant to inform the assessment of the cumulative ecological effects".*

In summary, the general approach has been to:

- conduct a review of existing hydrological, hydrogeological and hydromorphological information;
- review proposed construction activities and design details;
- walkover surveys;
- establish baseline conditions from data collection through detailed visual observations, drilling boreholes and establishing the geology and nature of aquifers, undertaking continuous and spot water level measurements, measuring stream flows and taking surface water and groundwater samples for laboratory analysis;
- establish a conceptual hydrogeological model; and
- construct hydrological models to assess surface water runoff and flood risk.

Specific methodologies that will be used to assess the different types of potential effects are described in more detail in the 'Assessment Methodology' section below.

14.4.1 Study Area

The surface water study area, including flood risk, is based on the stream catchments at and around the Wylfa Newydd Development Area, as well as important surface water features. The surface water study area is shown in figure 14.1. This area has been set as it captures all surface water features of relevance to the impact assessment.

The fluvial geomorphology study area is based on stream catchments extending out to a buffer of 1km from the Wylfa Newydd Development Area. Consideration is given to adjoining upstream and downstream water bodies outside of this immediate buffer zone, to ensure all surface water features of relevance are captured in subsequent assessments (See figure 14.2).

For the groundwater assessment a conservative approach has been taken by identifying two zones for the study area. This approach has been adopted due to a number of uncertainties regarding the radius of potential effects to hydrogeological receptors. A 3km radius study area centred on the Wylfa Newydd Development Area has been adopted to ensure that all relevant features that could be of concern to the public and regulators are being assessed. Within this, an inner study area with a 1.8km radius from the centre of the Wylfa Newydd Development Area allows focused assessment on the groundwater features of relevance which have the highest potential of being affected by the development including the Sites (see figure 14.3).

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Figure 14.1: Surface water study area and key receptors

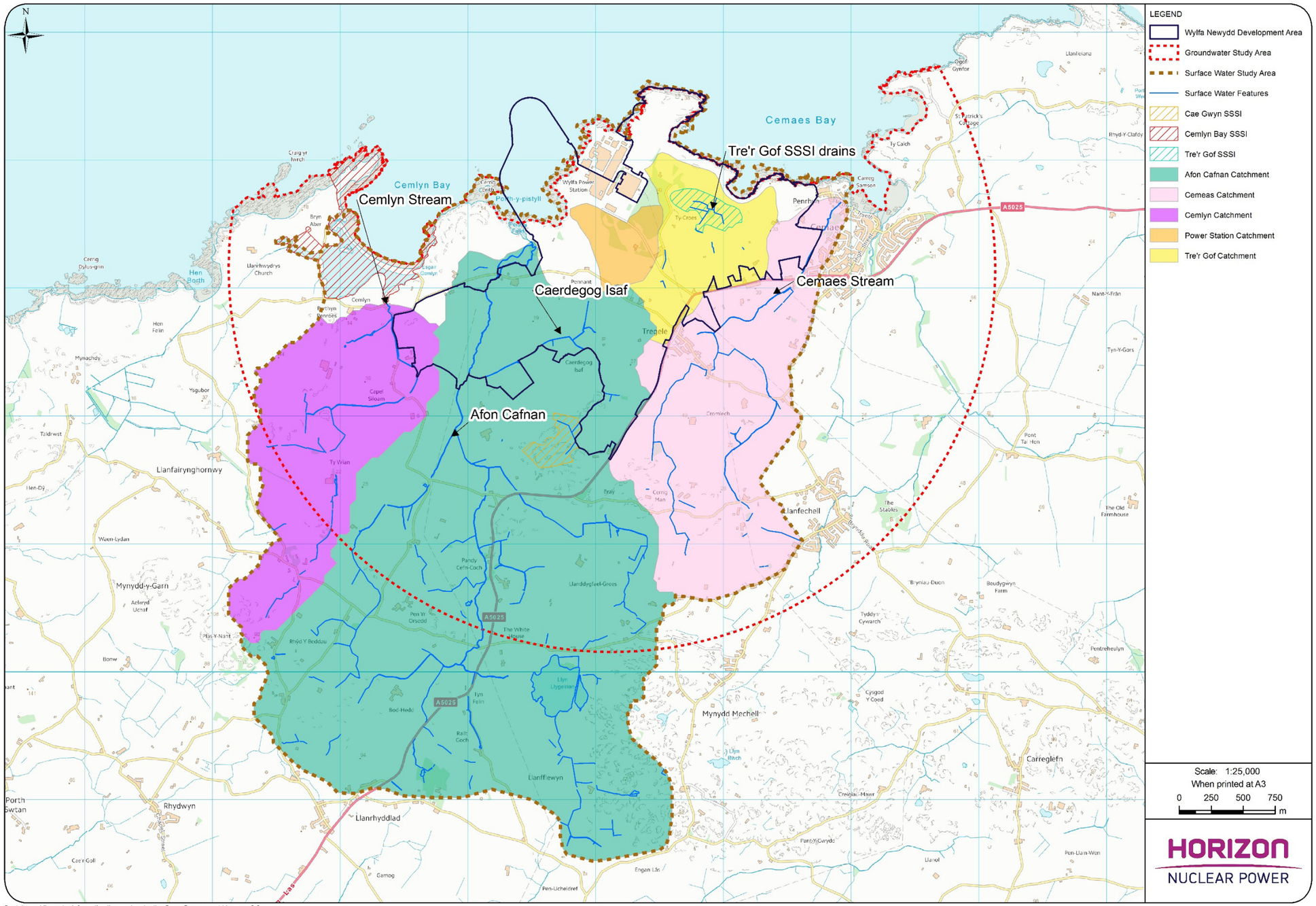

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FIGURE 14.1 / SURFACE WATER STUDY AREA - CATCHMENTS, MONITORING LOCATIONS AND SURFACE WATER FEATURES / 60PO8032_DCO_14_01

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Figure 14.2: Fluvial geomorphology study area and key receptors

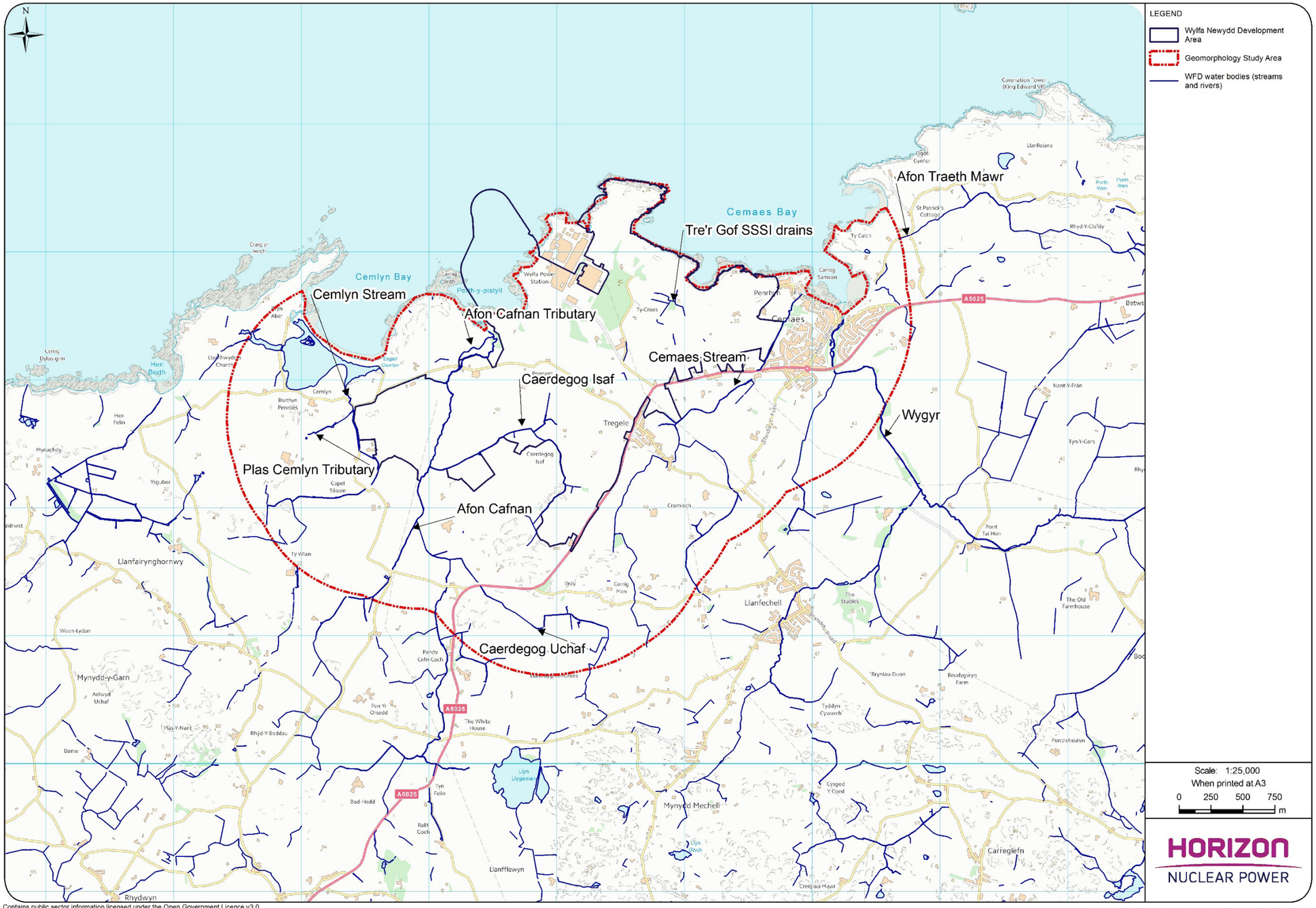

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FIGURE 14.2 / GEOMORPHOLOGY STUDY AREA / 60PO8032_DCO_14_02

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	WN03.03.01-S5-PAC-REP-00004	Issue date:	15/03/2016

Figure 14.3: Groundwater study area and key receptors

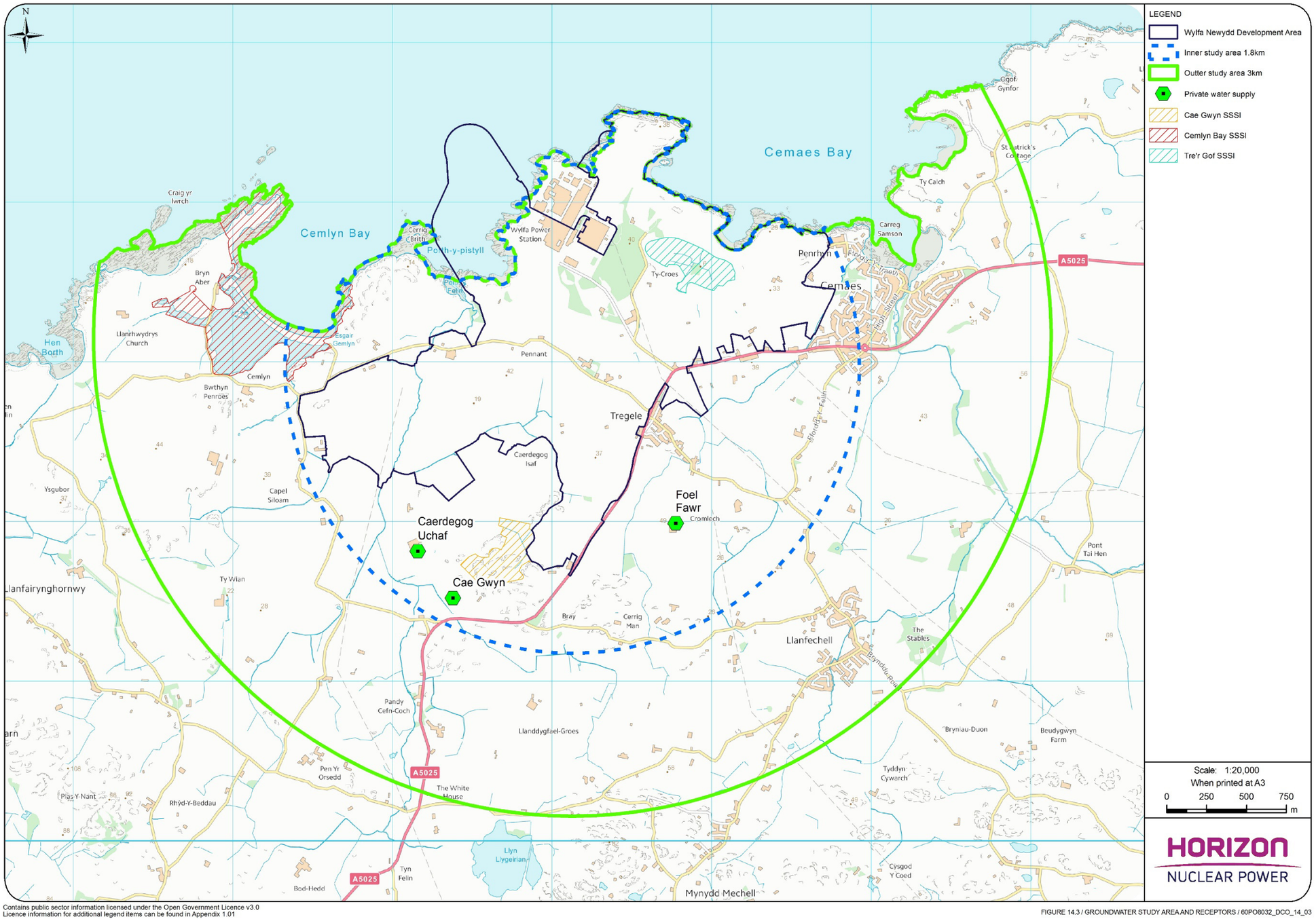

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FIGURE 14.3 / GROUNDWATER STUDY AREA AND RECEPTORS / 60PO8032_DCO_14_03

14.4.2 Assessment Methodology

There are no specific relevant published guidelines or criteria for assessing and evaluating effects on hydrology, hydrogeology or geomorphology within the context of an EIA. This assessment is therefore based on a methodology derived from the IEMA guidance (2004) which sets out a list of criteria for evaluating the environmental impacts, as follows:

- the importance or value of the resource under consideration;
- the magnitude of the impact in relation to the resource that has been evaluated; and
- the significance of the impact.

The groundwater assessment will focus on the potential effects of the Proposed Activities on groundwater movement. The potential for the Proposed Activities to affect sensitive receptors, including the water resource, local groundwater abstractions, base-flow to surface watercourses and groundwater dependent terrestrial ecosystems will be assessed, and the need for any mitigation identified.

The surface water assessment will focus on the flow or quality characteristics of sensitive receptors within and around the Wylfa Newydd Development Area including the SSSIs, the Cemlyn Bay SSSI and Special Area of Conservation, and all other watercourses and water bodies. The fluvial geomorphology assessment focusses on the morphology of the stream bed and banks.

Modelling will be used where appropriate to predict changes in runoff due to the changes in landform characteristics.

The impact assessment process will be iterative, whereby mitigation measures identified as required in early assessments will be incorporated into the design of the Proposed Activities and inform the appropriate environmental management plan during construction, reducing the potential for significant effects.

Flood risk issues related to the new nuclear power station are being assessed through a programme of inter-related flood risk studies including the nuclear safety case external hazards assessment in accordance with NPS EN-1, NPS EN-6 and TAN15.

14.4.3 Assessment Criteria

The methodology sets out a list of criteria for evaluating the environmental effects, as follows:

- the importance (value) of the resource under consideration on a scale of sensitivity (i.e.high, medium, low ornegligible);
- the magnitude of the effect in relation to the resource that has been evaluated, quantified using the scale high, medium, low, or negligible; and
- the significance of the impact using a matrix and the scale major, moderate, minor and negligible.

An impact of major, moderate or minor is considered significant and, if appropriate, professional judgement should be used to identify appropriate mitigation to reduce the impact significance. An impact of negligible is not considered to be significant and no mitigation is required.

To classify the severity of the flood risks following the guidance in TAN 15 it is necessary to look at the nature and scale of the individual effects. These include, but are not confined to, the extent of flooding, the depth of flooding, the duration of flooding and the velocity of flood waters. For new developments the assessment is based on the likely post-development situation, for off-site receptors it is based solely on the likely deterioration.

Once the significance of the potential effect and likelihood of occurrence have been assessed these are then combined using a risk matrix to assess the flood risk of each potential effect. Typically flood risks assessed as low or less are considered acceptable. If the assessment results in moderate or high risk this is considered to be significant (i.e. equivalent to a significant impact under the EIA regulations) and additional mitigation measures will be required to facilitate development.

In some situations the risk assessment procedure will result in an artificially low assessment of risk. This is particularly the case in situations where consequences of very rare flooding (i.e. breach scenarios) are so extreme that any residual risk however low should not be allowed. In such instances the assessed risk would be elevated. Such decisions would always be made through expert judgement and would be accompanied by detailed justification.

15 Coastal Processes and Coastal Geomorphology

15.1 Introduction

This chapter provides an assessment of the potential effects of proposed activities within the Wylfa Newydd Development Area (Proposed Activities) on coastal hydrodynamics and geomorphology. These activities include the construction of marine elements of the Wylfa Newydd Generating Station such as the CWS and the MOLF and associated breakwaters. The chapter is intended to summarise the key outputs from coastal hydrodynamic studies, including the basic mechanics of physical processes caused by waves, tides and currents including bed shear stress and sediment transport processes. In particular coastal processes shape the coastal landforms. Understanding these processes also informs assessment of changes potentially impacting on the marine environment and affecting flora and fauna. Such effects are described in Chapter 16.

No activities are considered likely to result in potentially significant effects at relevant coastal processes and receptors as a result of the location of the preferred sites for the Off-Site Power Station Facilities. Therefore it is proposed to scope out the Off-Site Power Station Facilities from coastal processes and coastal geomorphology assessment.

15.2 Existing Environment

The NPS EN-1 and EN-6 require new nuclear power projects to be supported by an assessment of coastal processes, hydrodynamics and sediment transfer at coastal and estuarine sites. A multi-method approach has been followed to characterise the coastal processes, sediments and geomorphological forms. It has involved the collection of data and information through desk study and survey in the field. Mathematical modelling has been undertaken, including an assessment of changes of bed shear stress. An area within a 5km radius from the Power Station Site was used to inform site selection and survey extent; this distance was defined based on knowledge of the mixing zones, modelling and professional judgement (figure 15.1).

Figure 15.1: Coastal Processes and Coastal geomorphology study area and fixed mooring locations

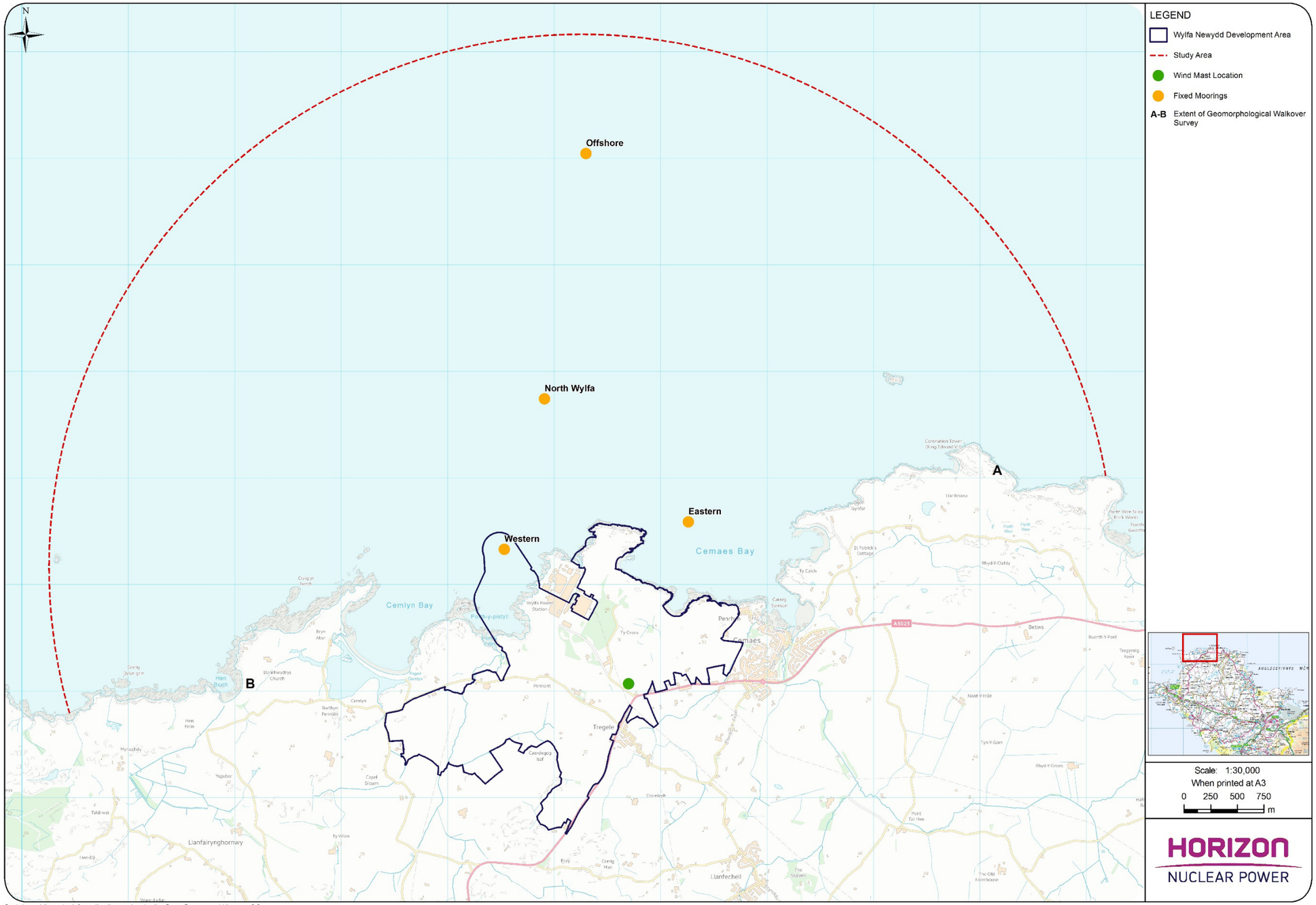

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FIGURE 15.1 / COASTAL PROCESSES AND COASTAL GEOMORPHOLOGY STUDY AREA AND FIXED MOORING LOCATIONS / 60PO8032_DCO_15_01

Figure 15.2: Designated water bodies and designated sites

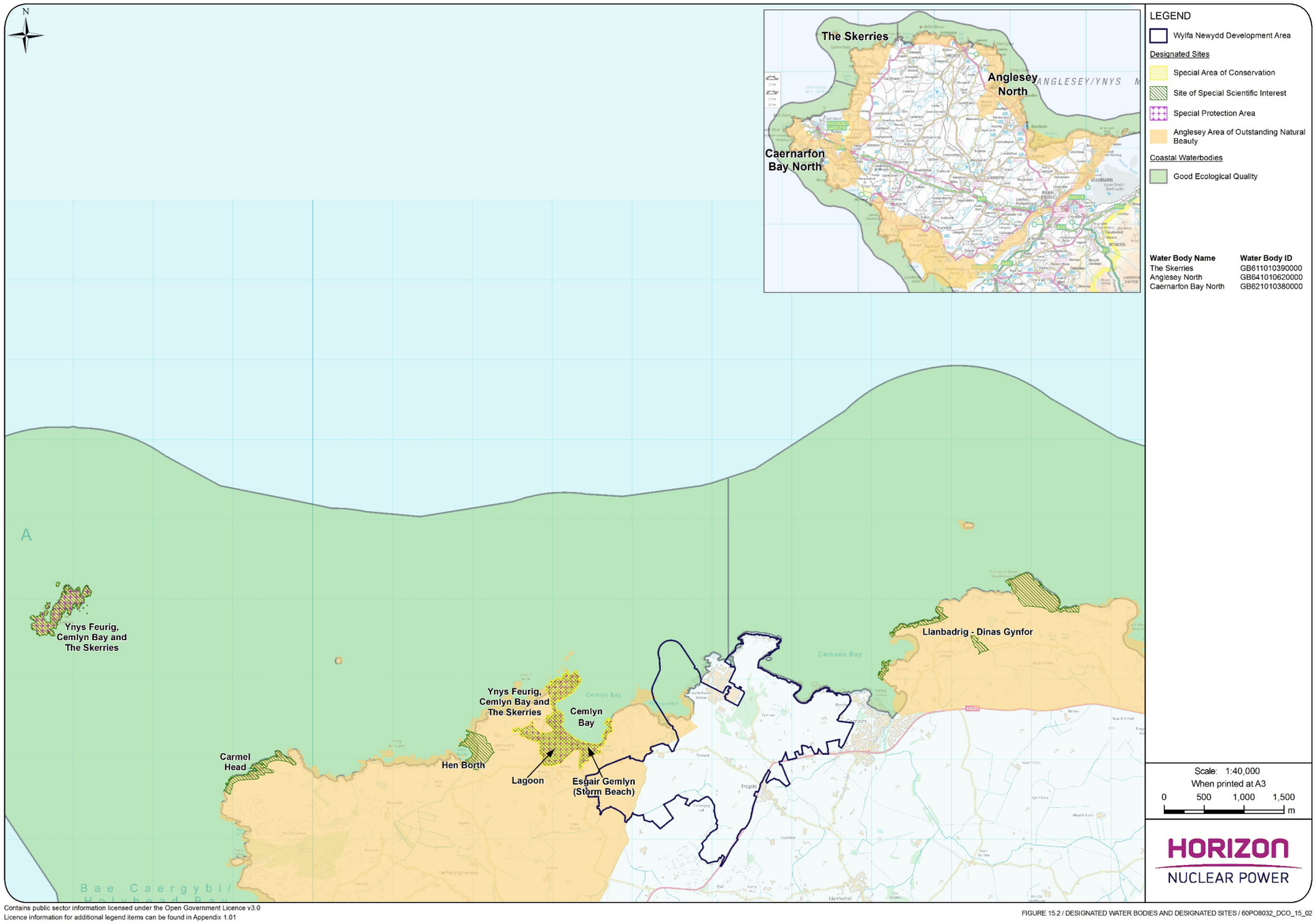

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FIGURE 15.2 / DESIGNATED WATER BODIES AND DESIGNATED SITES / 60PO8032_DCO_15_02

15.2.1 Designated sites

A number of designated sites exist adjacent to or within 5km of the Wylfa Newydd Development Area including two key water bodies, The Skerries and Anglesey North, which are described in table 15.1 and shown in figure 15.2.

Table 15.1 Water Framework Directive coastal water bodies

Description	The Skerries water body	Anglesey North water body
Water body ID	GB611010390000	GB 641010620000
River Basin District	Western Wales	Western Wales
Typology	Exposed macro-tidal	Moderately exposed macro-tidal
Protected Area	Yes	Yes
Overall Ecological Status	Good	Good
Hydromorphology	Not designated as A/HMWB	Not designated as A/HMWB
Morphology	High	High
2015 Predicted Ecological Quality	Good Status	Good Status
2015 Predicted Chemical Quality	Good	Good

The specific coastal geomorphology receptors identified are:-

- The seabed – this covers the area within Porth-y-pistyll and surrounding bays west of Wylfa Head. These are valued as low value due to its sensitivity and tolerance to accommodate change. The Porth Wnal Dolerite is included as a receptor in chapter 16 (soils and geology). In addition specific bays have been identified as receptors in themselves.
- Cemaes Bay – to the east of Wylfa Head cited in the Anglesey North waterbody which is assigned a value of medium as it is considered to have a slightly higher sensitivity than the surrounding seabed.
- Cemlyn Bay – cited within the Skerries waterbody immediately to the west of Wylfa Head and also valued as medium due to its sensitivity.
- Esgair gemlyn – a shingle beach some 400m from the Wylfa Newydd Power Station at its central point that is protected as part of the Cemlyn Lagoon SAC. Esgair gemlyn is assigned a high value as it is considered to be a sensitive receptor.

- Cemlyn lagoon – this is designated as a SAC and SSSI (and is also covered by the Ynys Feurig, Cemlyn Bay and the Skerries SPA). The lagoon is dependent upon Esgair gemlyn and as it is a part of a European designated site it is valued as high.
- Hen Borth cliff – a geological SSSI which is a glacial feature (drumlin) exposed as a cliff, located approximately 1500m from the Wylfa Newydd Power Station at its central point. Hen Borth is valued as high.

There are two important designated sites on Anglesey for coastal geomorphology, namely Newborough Warren (important as a coastal assemblage/group) and Tywyn Aberffraw, a large and intact dune system with dune ridges. These are 62km and 54km respectively from the centre of the Wylfa Newydd Generating Station and as the result of their distance from the site have therefore been screened out of the need for further assessment.

There are also a number of designated sites several kilometres from the Wylfa Newydd Generating Station designated for their fauna and flora. Information collected to date suggests that changes in hydrodynamic and sediment processes are unlikely to affect receptors at these sites due to distance. There is one conservation designation, Ynys Feurig, Cemlyn Bay and The Skerries (SPA), that is only 400m from the Wylfa Newydd Development Area and the impact on breeding birds and their foraging may need to be assessed. This is addressed in the Marine Environment Chapter 16.

15.2.2 Geomorphology

The topic study area is composed of mainly hard rock cliffs with pocket sandy bays. Much of the unconsolidated material along the coastline eroded or detached during the glacial period, and has since been moved and sorted by currents driven by tidal and wave forces.

Six key coastal geomorphology types were identified during a walkover survey in November 2014. This is a broad categorisation. In addition at a local scale coastal features include beach cusps, a small tombolo and potentially remnant sand dunes. Due to the steep nature of the joining streams, very short lengths of ‘tidal estuary’ were observed. For example, at Cemaes Village (in Cemaes Bay) about 100m length of water body was determined to have both freshwater and saline influences.

15.2.3 Bathymetry and sediments

Gravels and exposed bedrock predominate along the North Anglesey coast. Transport of sand and gravels within the littoral zone is in a dominant eastward direction. There may be some exchange across the littoral zone with gravel moved offshore during storms. The movement of sediment into the area from offshore is, however, considered to be minimal.

At Porth-y-pistyll Bay the coast is characterised by rocky headlands and small sandy bays. Beyond the coastal zone there are also distinctive subtidal rocky seabed knolls, rising 4-5m above the seabed floor. At Wylfa Head, large, rocky outcrops dominate and rapidly shelve into waters some 30m to 40m deep. The seabed here consists of an irregular wave-like rock head surface covered, in part, by a complex boulder clay sequence. In turn this is covered by thin lag deposits (See figure 15.3).

Figure 15.3: Irish Sea overview of sediments and bathymetry

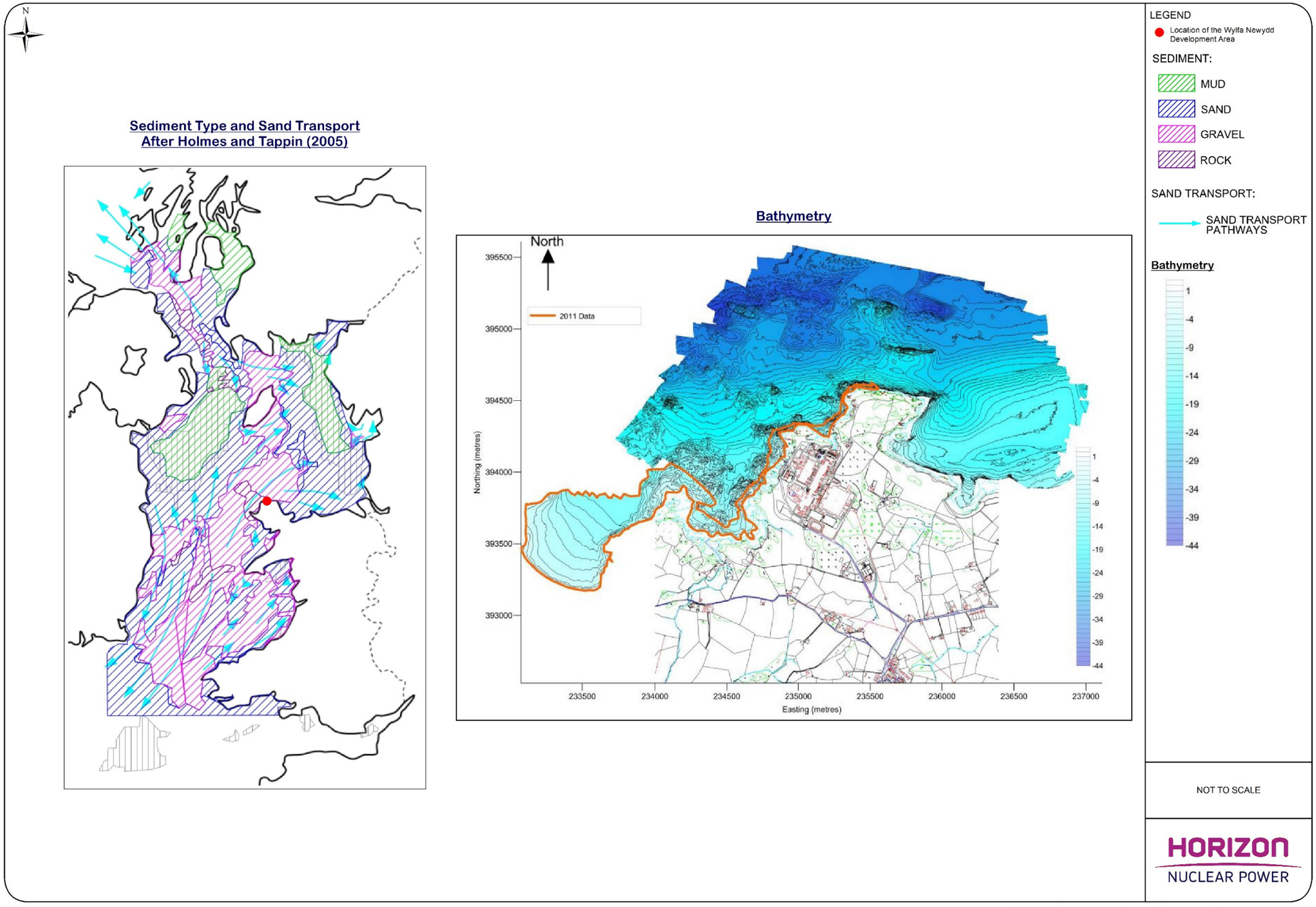
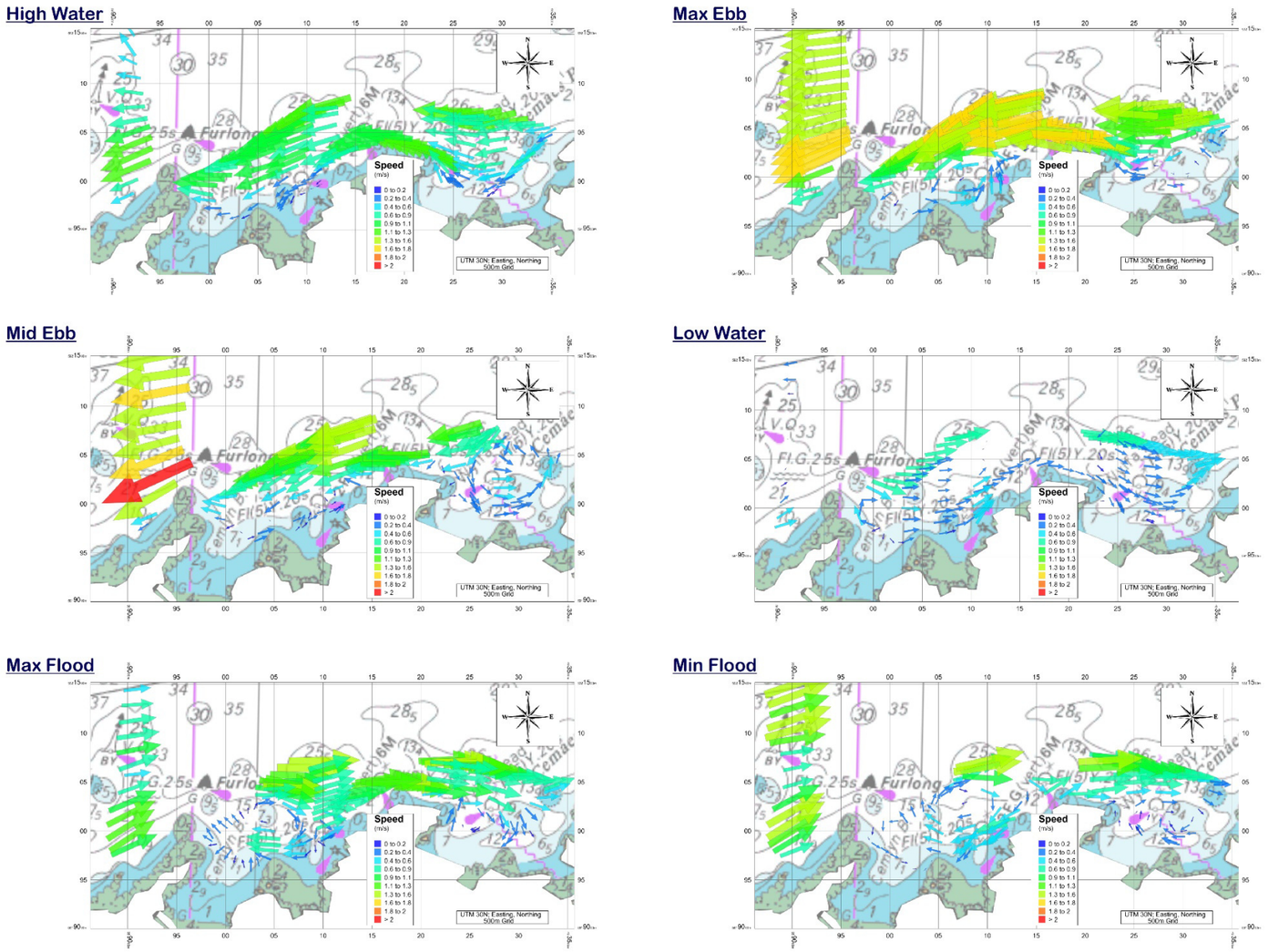


FIGURE 15.3 / IRISH SEA OVERVIEW OF SEDIMENTS AND BATHYMETRY / 60PO8032_DCO_15_03

Figure 15.4: Spring tide currents



NOT TO SCALE

HORIZON NUCLEAR POWER

FIGURE 15.4 / SPRING TIDE CURRENTS / 60PO8032_DCO_15_04

The sand and gravel lag deposits on the sea bed have been swept into the many coves in the area and form the sediments at the back of Cemlyn and Cemaes Bays. Cemlyn Lagoon has in part been formed by the accumulation and formation of a shingle barrier beach. These gravels and cobbles are a legacy deposit likely to be supply-limited and therefore potentially vulnerable to change.

Porth-y-pistyll Bay can be described from a geomorphological perspective as a bay-head or pocket beach contained within an embayment bounded by headlands (between Cerrig Brith and Trwyn y Galen-ddu). Normally, sediments captured in such bays may undergo some longshore drift within the bay itself, but the sediment may generally be unable to escape from the enclosed system due to the relatively high wave energy conditions affecting the headlands.

15.2.4 Tides, currents and eddies

The tides are semi-diurnal occurring approximately every 12.4 hours. Currents are west to east off Wylfa Head on the flood (incoming tide) and east to west on the ebb (outgoing tide). At the furthest offshore mooring buoy, the ebb currents were recorded as being stronger than the flood and the maximum recorded ebb current speed was 2.3m/s between August 2010 and February 2011. Currents measured closest to Wylfa Head had maximum speeds (depth averaged) of 2.1m/s.

A maximum measured tidal range of 7.5m has been recorded at Wylfa Head and Cemaes Bay. The maximum and minimum recorded tide levels were +3.9mOD to -3.6mODrespectively. The most extreme tide levels predicted by Defra/Environment Agency[28] are rises of +4.7mOD at Cemaes Bay and +4.6mOD at Wylfa. These levels are based on extrapolation and the annual probability of occurrence is 0.01%.

Wylfa Head itself causes a stable eddy structure (swirling currents) to form in Cemlyn Bay (to the west) and Cemaes Bay (to the east) on both the flood and ebb tides. The rotation and strength of eddies varies over the flood-ebb cycle. The maximum current speeds recorded were 0.95m/s (to the west of Wylfa Head) and 1.1m/s (to the east). The headland itself influences the main direction of the flows.

An aerial survey of the heat in cooling water from the Existing Power Station outfall showed little influence of the thermal plume into either Cemlyn or Cemaes Bays. Figure 15.4 shows the evolution of eddying or swirling currents on a spring tide. At high water during a spring tide there is a flow to the west of up to 1m/s; within the bays currents are lower. Eddies also assist with mixing between the bays and the strong currents north of Wylfa Head.

15.2.5 Sea Level Rise Projections

A projected relative sea level rise of 488mm by 2090 has been estimated using UKCP09 guidance and the latest UK guidance on relative sea level rise (Environment Agency, 2011[29]).

[28] Defra/ Environment Agency., 2011. Coastal flood boundary conditions for UK mainland and islands., Flood and Coastal Erosion Risk management R&D. https://www.gov.uk/.../coastal-flood-boundary-conditions-for-uk-mainland- and-islands-design-sea-levels [Accessed 29 July 2015]

[29] 1.124 Environment Agency., 2011. Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities https://www.gov.uk/government/uploads/.../geho0711btzu-e-e.pdf [Accessed 29 July 2015]

15.2.6 Wind Conditions

The prevailing wind direction (sustained wind and gusts) collated from a number of local sources indicates two dominant wind directions, predominantly south-westerly and some north-easterly winds. This affects the way in which the coast has evolved and the coastline in the study area is sheltered from the prevailing wind.

15.2.7 Wave Climate

Two types of waves have been identified in the study area: swell waves originating from beyond the area; and those locally generated by wind. Significant wave height and direction varies with distance from the shore and that the most common wave direction was from the west. The wave climate along the Anglesey coastline varies in response to:

- swell waves approaching from the Irish Sea;
- wind conditions;
- uninterrupted fetch over which winds can blow and generate waves;
- water level;
- orientation of the coastline and presence of headlands etc.; and
- the inshore bathymetry.

The north Anglesey coast is exposed to waves approaching from 270°N to 090°N.

A series of wave buoys deployed between August 2010 and February 2011 indicates a predominant wave direction from the west (5.5% calm). The orientation of the coastline prevents swell waves approaching from the south-west. However, locally generated wind waves approach from a range of other directions.

Significant wave heights were found to be lower in the sheltered bays compared with offshore. The average significant wave height west of Wylfa Head was 0.68m (recorded between October 2010 and January 2011). At the furthest offshore mooring the average significant wave height recorded was 1.24m.

Longshore transport along the coastline tends to be weak because of the effects of shoaling within the bays, and diffraction around the headlands. Offshore wave-induced transport may occur with a general easterly direction along the north Wales coast. At some localities littoral drift may change direction dependent on the prevailing wind directions. The transport regime between nearshore and offshore zones may be complex.

15.3 Potential Effects and mitigation proposals

Potential effects associated with the Proposed Activities during the construction, operation and decommissioning phases, are listed below:

- Disruption of sediment transport processes and changes in patterns of erosion and sedimentation during installation and dismantling of the temporary breakwaters and MOLF leading to potential changes in sub-tidal and inter-tidal geomorphology and sediment processes.
- Disruption of sediment transport processes and changes in patterns of erosion and sedimentation during construction of the marine elements of the Power Station leading to a change in inter-tidal and sub-tidal geomorphology and sediment processes.

Activities which have the potential to cause these effects include dry excavation (including coffer damming and piling), wet excavation, tunnelling and installation of the cooling water intake and outfall structures.

- Direct new drainage pathways to sea at Porth-y-pistyll. Potential for suspended sediment to reach the Skerries EU water body.
- Changes in the sea bed from scour during the operation of the Power Station.
- Changes in water quality due to discharge from the Cooling Water System during operation.

It is anticipated that the Environmental Management Plan would be in place to record the procedures and mitigation measures to be adopted during the construction phase, as well as all necessary consents and licences being in place prior to commencement of any works, including a number of marine Licences. Following the consenting process, the works would be required to be carried out in accordance with any conditions imposed.

The application of good practice in the construction of the MOLF and breakwater will reduce the predicted magnitudes of residual effects and mitigation through the design process should reduce the footprints of the structures to a minimum, thereby minimising potential effects during operation.

15.4 Proposed Scope, Methodology and Criteria

An assessment has been undertaken at this stage using available data, information and modelling results to understand potential impacts. Due to uncertainty the assessment has also relied heavily on professional judgement and it may be that further information and data (when it becomes available) will change the assessment. The residual effects assume that a certain level of design mitigation and other mitigation would be implemented.

15.4.1 Study Area

Baseline surveys to characterise and inform changes in coastal processes have been undertaken for the offshore areas within a 5km radius of the Wylfa Newydd Generating Station. The modelling extent has focused on an area extending out towards the tidal excursion limits (some 20-25km), centred on Wylfa Head. However survey focused on areas where potential impacts would be likely to occur. This hydrodynamic work also captures thermal plume issues (reported separately in chapter 16).

A land-based geomorphology survey was undertaken in November 2014 to characterise potential sensitivity of the coastline, and extended for approximately 2km east and 3km west of Wylfa Head. This narrower study area was selected based on professional judgement that significant effects on coastal processes and coastal geomorphology are unlikely to extend beyond major headlands.

15.4.2 Assessment Methodology

Assessment of potential changes to coastal processes and effects on geomorphological receptors has been based on a desk study, field surveys and modelling. Numerical modelling has been undertaken for assessment of potential changes to the hydrodynamics and sediment regime resulting from the various development activities. Accuracy of these models has been

established using observations and field surveys and further work is planned using Horizon's Phase 2 hydrodynamic model. Tidal flow modelling, sand transport modelling (including bed shear stress) and sediment plume dispersion modelling are included within the scope of this further work and these outputs will be used to inform the assessment of potential effects presented in the environmental statement chapter for Coastal processes and Coastal geomorphology.

The specific approach followed is to:-

- determine the relevant coastal processes and receptors;
- derive their value (importance);
- identify impacts arising from the project activities;
- determine the magnitude of change potentially resulting from these impacts; and
- present the significant effects and consider how mitigation might reduce these to a residual level.

15.4.3 Assessment Criteria

Assessment criteria determining the magnitude of change and the sensitivity of the receptors have been developed for assessment of coastal processes and coastal geomorphology based on the principles as defined in chapter 7 Approach to EIA.

The criteria used to determine the value and sensitivity of receptors considers the level of importance of the receptor and its characteristics, as well as the economic value and the abundance of the receptor. The magnitude is a measure of the scale or spatial and temporal extent of the change in the baseline condition, irrespective of the value of the receptors affected. Criteria used to determine the magnitude of change consider: the effect on the receptors' integrity; the nature of the effect (i.e. continuous vs intermittent); the capability of the receptor to adapt to the impact; and the spatial extent of the impact. Significance of effect (where applicable) is determined through professional judgement, taking into account the value of the receptor and the magnitude of effect using a significance matrix that has been developed.

Overall, a preliminary assessment has shown the effects of construction, operation and decommissioning are likely to have residual impacts of negligible to minor adverse. This assumes that agreed mitigation would be in place to reduce impacts.

16 The Marine Environment

16.1 Introduction

This chapter of the Scoping Report addresses issues related to marine ecology, marine sediment and water quality. There are links between marine, terrestrial and freshwater ecology, and the links between topics will be considered in the terrestrial and freshwater ecology (chapter 11). This chapter also links closely with surface water and ground water (chapter 14), and chapter 15 on coastal processes and geomorphology.

In preparation for the application for the Wylfa Newydd Project, marine surveys were carried out in the study area shown on figure 16.1. The issues relate entirely to the main Power Station Site, as none of the Off-Site Power Station Facilities in the DCO application are likely to affect coastal or marine waters.

16.2 Existing Environment

16.2.1 Habitat types and sediments

Anglesey lies within the Irish Sea and is separated from mainland Wales by the Menai Strait. Tidal flows are typically strong (greater than 1.5 ms^{-1}) and are mostly orientated parallel to the coast. The Power Station Site is located on the North Anglesey Coast. This part of coastline comprises a diverse group of environments that are characteristic of a moderately exposed, western UK rocky coastline dominated by large marine seaweed. Offshore, the substrate comprises a mix of solid rock, boulders and cobbles, and sediments, including gravel and sands in variable proportions.

Benthic grab samples of sub-tidal sediments (muds, sands and gravels) were undertaken in spring 2010 and 2011 (see figure 16.1). The sediments contained a high number of species at moderate abundances, although the number of species decreased at shallower, inshore sites. Offshore sites were more diverse and dominated by polychaete worms. In general, the marine benthic habitats are considered to be of high quality and indicate a generally undisturbed seabed.

Drop-down camera work undertaken in spring 2010 and 2011 identified a number of habitats:

- extensive areas of brittlestar (*Ophiuroidea* spp.) beds were recorded around and immediately to the north (within 400m) of Wylfa Head;
- areas of rocky reef communities rich in animal life such as bryozoans and octocorals; and
- sand patches with little surface-dwelling fauna owing to the strong tidal scour along the coast.

In Porth-y-pistyll, diver surveys in 2010 to 2012 and 2014 identified a mosaic of habitats including rocky reef habitats rich in seaweeds, areas of open sand or gravel with little fauna, and areas of thick drifting seaweed dislodged from the seabed. Diver surveys around the rocky headlands recorded a diverse range of sponges, hydroids and bryozoans. The surveys recorded one incidence of the European spiny lobster (*Palinurus elephas*), a Section 42 (NERC Act) Species of Principal Importance in Wales.

Intertidal habitat surveys carried out between 2010 and 2014 have identified a complexity of habitats within the study area, allied to the influence of tidal conditions. Eight broad habitats have been identified and mapped, the most notable being species-rich rockpool habitats within Porth-y-pistyll and Porth y Felin bays.

No species with conservation protection have been recorded in the habitat surveys to date.

Figure 16.1: Marine environment study area

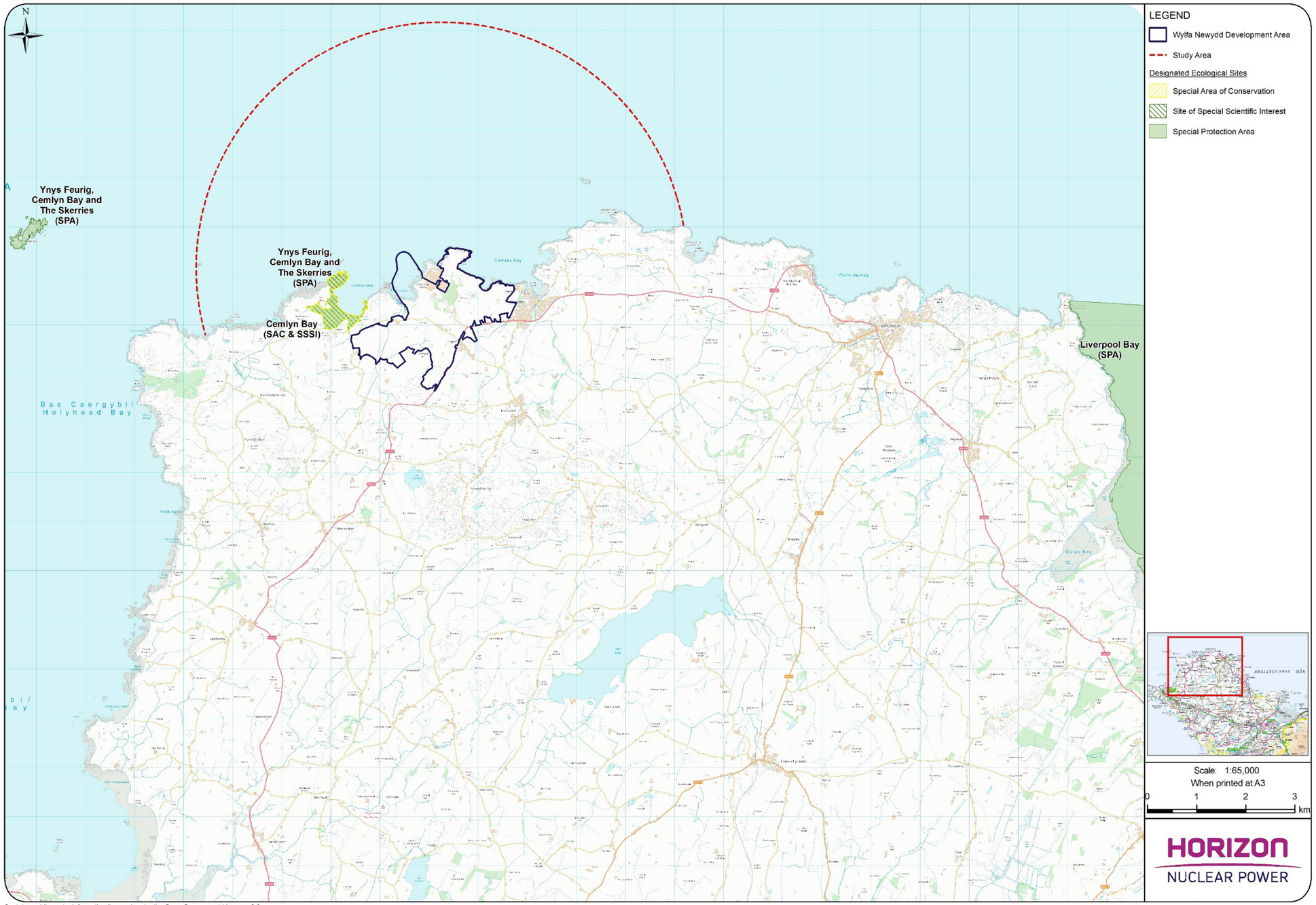


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FIGURE 16.1 / MARINE ENVIRONMENT STUDY AREA / 60PO8032_DCO_16_01

16.2.2 Water quality

Marine water quality has been monitored on a monthly basis since spring 2010 in combination with sampling for plankton. Figure 16.2 shows the locations of the water quality, phytoplankton and zooplankton sampling sites. Measured parameters have changed as the programme has progressed between 2010 and 2014, but have included metals, organics, nutrients, suspended solids, radioisotopes, chlorination by-products, anti-corrosive agents contained in power station process water and a range of *in situ* parameters (for example, temperature, salinity and dissolved oxygen).

Physical data have shown there to be no evidence of permanent haloclines (salinity layers) or thermoclines (temperature layers), nor any seasonal layering of the water column. Nutrient concentrations were consistently low, indicating very little nutrient enrichment in the survey area. Dissolved oxygen measurements were typical of levels in coastal waters around Anglesey.

The majority of chlorination by-products analysed were below their limit of detection or in very low concentrations. Organic compounds were almost always below the limits of detection and concentrations of metals were very low in general. All metals were found in low concentrations at levels below the relevant Environmental Quality Standards (EQS), with the exception of one sample in one month where mercury levels were slightly above the maximum allowable concentration EQS.

Radioisotope monitoring in Cemaes Bay and Cemlyn Bay found that radioactivity was consistent with data previously. It is widely recognised that the levels of artificial radionuclides in and around the Irish Sea are strongly influenced and elevated by concentrations derived from discharges at Sellafield, Springfields and Heysham, which can all but mask locally derived activity.

In general, marine water quality results were consistent across all the survey sites within the study area and the waters are regarded as being good quality.

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	WN03.03.01-S5-PAC-REP-00004	Issue date:	15/03/2016

Figure 16.2: Water quality, phytoplankton and zooplankton sampling sites

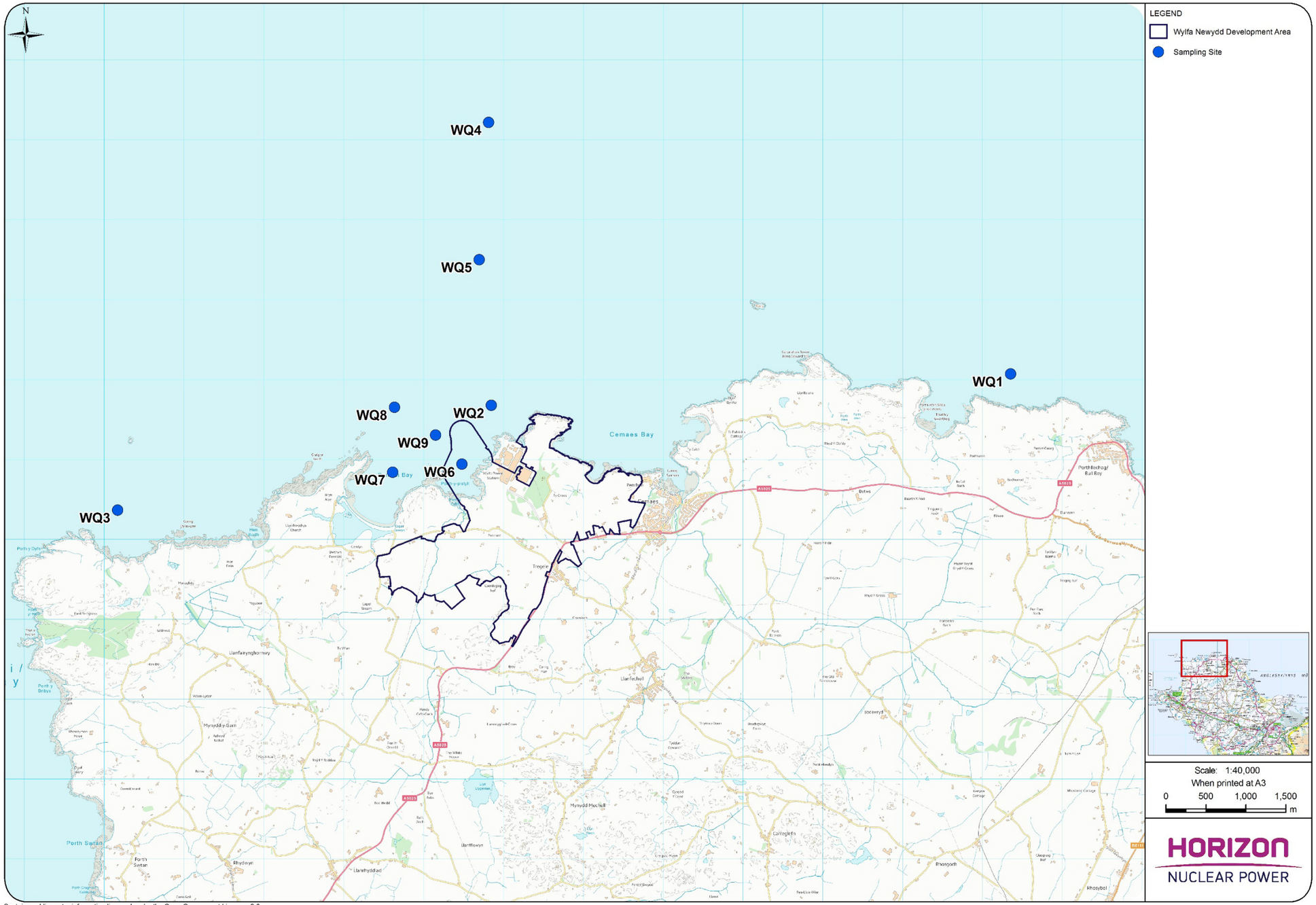

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FIGURE 16.2 / WATER QUALITY PHYTOPLANKTON AND ZOOPLANKTON SAMPLING SITES / 60PO8032_DCO_16_02

16.2.3 Phytoplankton and zooplankton

Phytoplankton and zooplankton sampling was carried out in the study area between May 2010 and September 2014 in the same locations as water quality sampling sites. Five sites were monitored on a monthly basis from May 2010 to April 2012. An additional site, located in Porth-y-pistyll, was added to the programme in August 2011 and was monitored monthly until October 2012. Sampling resumed in March 2014 at a revised selection of the original sites including two additional locations; one in Porth-y-pistyll and one in Cemlyn Bay.

Phytoplankton abundance and community composition were similar between the sites monitored and exhibited seasonal patterns, driven by changes in the light and nutrient regime in the water column. The start of the phytoplankton production period was characterised by a spring peak in abundance in May/June. Phytoplankton abundance and chlorophyll-a values were below the indicator values set for bloom conditions under WFD guidance.

Diatoms were the most abundant phytoplankton group for the majority of the monitoring period and the species encountered were typical of the Irish Sea. During the monitoring period, 11 nuisance/harmful and 12 toxic algal species were reported at very low cell densities, below the threshold values at which an individual taxon is considered to reach bloom densities under WFD classification.

Zooplankton abundance was numerically dominated by Copepoda and exhibited a lag response to the seasonal peaks in phytoplankton abundance. There were no differences in zooplankton abundance or composition between the sites and the species recorded were typical of the Irish Sea. No protected species of phyto or zooplankton have been identified from the waters off north Anglesey during the sampling period.

16.2.4 Marine Fish

Fish surveys, using numerous techniques since 2010, have resulted in more than 90 species being recorded.

Ichthyoplankton have been sampled monthly and on various tidal states from six sites along the north Anglesey coast since 2010. Abundance peaks between March and May following spring spawning of various species. Overall, the ichthyoplankton samples were dominated by sandeels (*Ammodytes*) (spring and autumn) with other abundant species being associated with inshore habitats such as gobies (*Gobiidae*), butterfish (*Pholis gunnellus*) and blennies (*Blenniidae*) as well as some flat fish species including plaice (*Pleuronectes platessa*) and dab (*Limanda limanda*). Commercial species for example, whiting (*Merlangius merlangus*), cod (*Gadus morhua*) and herring (*Clupea harengus*) comprised less than 10% of samples.

Intertidal fish surveys have been undertaken quarterly since 2010 using seine nets and fish traps. Catches varied noticeably between seasons and from year-to-year, with highest catches occurring in summer. The dominant species were sandeel, clupeids, sand smelt (*Atherina presbyter*), plaice and gobies.

Subtidal fish catches varied noticeably between seasons and sites. The most abundant species were dab and whiting. Species such as dab, poor cod (*Trisopterus minutus*), common dragonet (*Callionymus lyra*), pogge (*Agonus cataphractus*) and pouting (*Trisopterus luscus*), typically contributed heavily to the beam trawl catch.

Several species of conservation importance, (included on the Section 42 list) , were recorded from the ichthyoplankton, intertidal and subtidal fish, and entrapment survey programmes including: Raitt's sandeel (*Ammodytes marinus*); plaice; herring; mackerel (*Scomber scombrus*); cod; sole (*Solea solea*); whiting; sea trout (*Salmo trutta*); bull huss (*Scyliorhinus stellaris*); ling (*Molva molva*); horse mackerel/scad (*Trachurus trachurus*); thornback ray; river lamprey (*Lampetra fluviatilis*); spurdog; tope (*Galeorhinus galeus*); anglerfish (*Lophius piscatorius*); lesser sandeel (*Ammodytes tobianus*); and, blonde ray (*Raja brachyuran*).

16.2.5 Marine Mammals

Specialist surveyors trained as marine mammal observers have surveyed since 2010 using recognised techniques of land-based surveys and opportunistic/casual sightings to record the presence of marine mammals. Records have been maintained from boat-based surveys since April 2010 and also during the vantage point seabird surveys between Cemlyn Bay and Cemaes Bay. Observations made from land-based surveys recorded all marine mammal and seabird activity at set locations for a set period of time.

A number of external organisations were contacted in order to collate their marine mammal records to supplement sighting made during the comprehensive baseline survey programme and provide an informative and detailed picture of the distribution and occurrence of marine mammals around the Anglesey coastline as well as the wider study area.

The land-based surveys have confirmed the frequent presence of harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncates*) as well as grey seals (*Halichoerus grypus*) within the study area; however no confirmed sightings of Risso's dolphin (*Grampus griseus*) were made.

Land based surveys and opportunistic sightings recorded 700 sightings in four years of harbour porpoise, distributed across the whole of the north coast of Anglesey; they are present year round with seasonal peaks during summer. The distribution of harbour porpoise is not uniform with hot spots located along the north coast of Anglesey. The distribution also extends north to the Isle of Man and off the west coast of the Lleyn Peninsula southwards into Cardigan Bay.

Bottlenose dolphin are present throughout the year with most sightings occurring during the summer months. The average pod size in Anglesey has been estimated to be 26.4 individuals. Seawatch Foundation records show the distribution of bottlenose dolphin is concentrated to the east of the study area along the coast between Bull Bay and Llandudno with other reported hotspots located within Cardigan Bay SAC and around the Lleyn Peninsula and Sarnau SAC.

No sightings of Risso's dolphin were made during the land-based and boat-based sightings over the period 2010 - 2014. This species has a relatively localised distribution in the Celtic and Irish Sea and is described as a wide band running south-west to north-west encompassing Pembrokeshire, the western end of the Lleyn Peninsula and Anglesey.

Within the study area, grey seals are present year round with peak sightings occurring between April and May.

16.2.6 Marine Birds

Seabird surveys were carried out between September 2010 and March 2015. The methodologies used included vantage point surveys over a 3.5km² study area, intertidal zone

surveys at Porth-y-pistyll and Cemlyn Bay and specific surveys of Cemlyn Lagoon. Vantage point surveys were initially carried out over a 36 month sampling programme between September 2010 and August 2013, followed by a six month sampling programme in 2014 (from April to September).

Intertidal zone surveys at Porth-y-pistyll were carried out over 36 months between April 2012 and March 2015 during which 80 visits were undertaken at low tide and 19 at high tide. Intertidal zone surveys at Cemlyn Bay were carried out over six months between October 2014 and March 2015.

Specific surveys of Cemlyn Lagoon were carried out in order to record the abundance, distribution and behaviour of seabirds present within The Cemlyn Bay section of Ynys Feurig, Cemlyn Bay and The Skerries SPA. In addition, surveys of the gull colony to the north of the Existing Power Station were carried out twice in April 2013 in order to record the abundance and species of gulls that use the area as a breeding site.

Four target species were recorded over the four year survey period: Arctic tern (*Sterna paradisaea*), common tern (*Sterna hirundo*), roseate tern (*Sterna dougallii*) and Sandwich tern (*Sterna sandvicensis*). The vast majority of both Arctic/common and Sandwich terns recorded were observed commuting through the vantage point areas, with only a fraction recorded foraging within the vantage point areas.

The secondary species recorded using the study area in greatest numbers were black-headed gull, common auks and herring gull.

The intertidal zone surveys in Porth-y-pistyll recorded a total of 30 species loafing and/or foraging including wigeon, curlew/whimbrel, herring gull, great black-backed gull, black-headed gull and oystercatcher.

A total of 37 species were recorded loafing and/or foraging Cemlyn Lagoon between September 2012 and April 2013, including black-headed gull, herring gull, curlew/whimbrel and golden plover.

Three species of gulls were recorded using the colony on the rocks to the north of the power station during April 2013; herring gull, lesser black-backed gull and great black-backed gull.

16.2.7 Non-Native Species

Recording of non-native species has been carried out as part of the analysis of survey results from all marine ecology surveys since 2010. All non-natives recorded during the survey programme are already known to occur around the coast of north Anglesey and are not unique to any particular area. Species recorded to date are:

- *Asparagopsis armata* (red alga);
- *Anotrichium furcellatum* (red alga);
- *Heterosiphonia japonica* (red alga);
- *Codium fragile* sub sp. *tomentosoides* (green alga);
- *Sargassum muticum* (brown alga); and
- *Elminius modestus* (barnacle).

Heterosiphonia japonica was found during the diving surveys at three sites in 2011 and at one site in 2012 and 2014. *A. armata* was recorded in fairly high densities in all three years. The non-native red alga *A. furcellatum* was recorded for the first time in 2014 to the north west of Cerrig Brith. *C. fragile* was recorded in the subtidal outfall surveys in 2011 and 2012 in abundances ranging from 'rare' to 'frequent'.

The invasive carpet sea squirt (*Didemnum vexillum*) is known to be present in Holyhead Marina and has the potential to cause major biofouling problems of marine structures. To date it has not been recorded in any of the marine ecology surveys. This species is generally restricted to marinas owing to the sheltered habitat they provide. The main vector, the carpet sea squirt, is generally considered to be the hulls of small sailing craft as they travel from port-to-port.

Non-native species are not considered to be receptors in themselves; however the potential impacts associated with non-native species will be discussed as part of the impact assessment and the potential effects on other receptors will be considered.

16.2.8 Conservation designations

The designated nature conservation sites in proximity to the Wylfa Newydd Development Area include SACs, SPAs and SSSIs and these are shown in figure 16.1 and listed below

A preliminary HRA screening exercise has been carried out (see chapter 9). This process identified three existing European sites and two further proposed sites where initial findings were that, at the current time and subject to further study, likely significant effects cannot be excluded. The features of these sites include receptors relevant to the marine environment which are known to be present within the study area. A full assessment and analysis will be included in the documentation provided with the DCO application

The following designated nature conservation sites are considered to be of relevance to the marine environment:

- Bae Cemlyn/Cemlyn Bay SAC and SSSI;
- Ynys Feurig, Cemlyn Bay and The Skerries SPA;
- Bae Lerpwl/Liverpool Bay SPA;
- The proposed Gogledd-orllewin Ynys Môn/Northwest Anglesey SAC ; and
- The proposed Gogledd-orllewin Ynys Môn/Northwest Anglesey possible SPA9.

The Cemlyn Bay SAC contains two Annex 1 habitats, 'coastal lagoons', which is the priority feature and primary reason for designation, and 'perennial vegetation on stony banks' which is a qualifying feature, but not a primary reason for designation. Cemlyn Bay is considered to be the best example of a saline coastal lagoon in Wales. The lagoon is separated from the sea by a shingle bank with a narrow channel at the western end, across which a sluice system was built in the 1930s. Seawater exchange occurs mainly through the sluice and by percolation through the shingle bank; although in extreme storms coinciding with spring tides waves break over the top of the shingle bank.

The Ynys Feurig, the Skerries and Cemlyn Bay Special Protection Area (SPA) comprises three separate areas along the north and west coast of Anglesey. The SPA is designated for its Annex 1 birds and regularly occurring migratory birds not listed on Annex 1. The SPA supports four species of breeding Tern (*Sterna* spp).

Other designated sites away from the immediate vicinity of the Power Station Site are the Menai Straits and Conwy Bay SAC and the Lleyn Peninsula and Sarnau SAC. The Menai Straits and Conwy Bay SAC is recognised for its biotype richness and although some 35-40km from Wylfa the northern boundary is within two tidal excursions (maximum distance on ebb). Possible effects on The Lleyn Peninsula and Sarnau SAC are unlikely given that it is greater than three tidal excursions (maximum distance on flood) from Wylfa and the residual flows of this peninsula are typically to the north.

In January 2016, NRW announced a consultation (running for 3 months) on possible changes to the marine SPA and SAC sites in Wales. These include a major expansion of coverage of protection for terns off the Anglesey coast (possible SPA) and the declaration of a SAC for harbour porpoise over a wide area, including waters off the north Anglesey coast. Ministers will decide whether or not to formally designate the proposed SPA and whether the proposed SAC should be formally submitted to the European Commission as a 'candidate SAC' in late 2016. The EU Habitats and Birds Directives apply only once the submission is made to Europe. Horizon will continue to engage with NRW during this consultation.

The Irish Sea is well known as a productive area for fisheries and consequently a number of EU fishery protected areas exists in the eastern Irish Sea and Liverpool Bay. However, the Power Station Site is not close to any major spawning grounds. The small fishing port of Amlwch is located 9km east of Wylfa Head, with the majority of boats involved in potting, otter trawling or sea angling charters. Potting for crustacean (lobsters, crabs, prawns and whelks) occurs throughout the Wylfa Head near-shore area. Bass are attracted to the cooling water discharge from the Existing Power Station, attracting leisure anglers to the area. The trawling for benthic species (sole, plaice, skate) occurs where sediments are suitable, particularly in Bull Bay.

16.3 Potential Effects and Mitigation

There is potential for direct habitat loss beneath the footprint of the marine and intertidal elements of the Power Station, including the MOLF, the breakwaters and the intake and outfall. Dredging associated with the CW system, the approach channel and MOLF would result in habitat loss and degradation.

Construction activities may include the installation of coffer dams, piling, blasting, dredging and deposition of materials, all of which can also lead to direct disturbance of marine species and birds feeding or otherwise using offshore waters. Sediments released into the water column will also lead to changes in water quality.

Onshore construction activities such as soil stripping, material movements, concrete batching, site drainage and import of materials via the MOLF could increase the risk of accidental pollution of near-shore waters.

Without mitigation activities such as ship movements and marine construction would increase the risk of the introduction and subsequent spread of non-native invasive species.

Once operational, the key potential effects will be related to the CW system. These might include:

- entrainment of planktonic organisms, fish and invertebrates;
- loss of food for local seabird and mammal populations;

- heated and chlorinated discharge affecting shallow benthic habitats and fish around the CW outfall;
- sea bed scour in the immediate area of the outfall;
- changes in marine water quality locally;
- possible changes to hydrodynamics and sediment transport regimes within and around Porth-y-pistyll and Cerrig Brith; and
- creation of new habitats on marine infrastructure such as the breakwaters.

There may also be a need for occasional maintenance dredging to maintain suitable CW intake conditions that would disturb any colonising species and habitats in the harbour area.

The construction-related effects would be mitigated through measures to be set out in the Environmental Management Plan once the principal contractor for the marine works has been appointed, and the construction techniques finalised. The choice of approach will be strongly influenced by the specific marine environmental sensitivities identified. The Marine Works will also be subject to a Marine Licence from NRW, which can be expected to include environmental protection conditions.

All site drainage works and discharges to the freshwater or marine environment will additionally be subject to Environmental Permitting by NRW. Again, such permits will include stringent environmental protection conditions.

The CW intake will be designed to reduce the risk of entrapment of individual organisms and so reduce the total numbers entrapped. Best practice will be used for impingement mitigation, and features such as coarse bar screens, low velocity intake, acoustic fish deterrents and fine meshed screens, fish and invertebrate recovery and return system will all be considered as appropriate and practical.

16.4 Proposed Scope, Methodology and Criteria

16.4.1 Study Area

The tidal excursion along the north coast of Anglesey is between 20km and 25km to the south-west (ebb) and south-east (flood). It was not feasible to survey this entire area and therefore surveys were focused on where potential impacts may occur. The extent of the study area was defined by the results of preliminary hydrodynamic modelling, which provided an initial indication of the dispersion of the cooling water discharge from the Wylfa Newydd Generating Station. An area within a 5km radius from the Power Station Site was used to inform survey site selection; this extent being defined by knowledge of the mixing zones, modelling and professional judgement (figure 16.1).

The extent of the study area relates to the near-, mid- and far-field zones which are defined by the dominant, physical mixing processes of the cooling water discharge with the ambient waters and are described by the Environment Agency (2010) as:

- the near-field zone which is determined by the initial momentum and buoyancy of the cooling water discharge;
- the mid-field zone which is determined by dilution and turbulent mixing by tides and winds; and

- the far-field zone which is determined by residual currents and weather conditions as buoyancy and temperature differences from ambient are negligible in this zone.

In reality these zones are in a constant state of flux caused by prevailing tidal and weather conditions.

Reference (control) sites were selected outside the tidal excursion where appropriate. Revised hydrodynamic modelling being carried out for the latest proposed design of the Power Station is expected to demonstrate the continued validity of the selected survey and reference sites.

16.4.2 Assessment Methodology and Criteria

The potential effects of the construction and operation of the Power Station on the marine environment will be assessed, using the final design parameters and the accumulated data from the marine surveys outlined above. The work will be undertaken in accordance with the requirements of the legislation and policy framework, including the NPSs (EN-1 and EN-6), the Water Framework Directive, the Marine Bill, the Marine Framework Strategy Framework and the Habitats Regulations.

NPS EN-1 states that '*….where the development is subject to EIA the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity* ….'. NPS EN-1 also requires applications to include an assessment of the impacts on coastal processes and geomorphology, marine ecology, biodiversity and protected sites, water quality and also an assessment of the vulnerability of the proposed development to coastal change. NPS EN-1 also requires applicants to show how the Project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.

Owing to the coastal and estuarine location of the nuclear sites the NPS for Nuclear Power Generation (EN-6) also goes on to state the requirement for the applicant to take account of climate change adaptation measures; assess specific implications of cooling water characteristics for the marine environment; assess the impacts on coastal processes, intertidal deposition and soil development; and the effects on the groundwater regime and its effects on terrestrial and coastal habitats. Section 3.9 of the NPS EN-6 goes on to state '…*baseline studies on nationally and internationally important habitats and species that may be affected as a result of the development should be undertaken by the applicant to inform the assessment of the cumulative ecological effects'.*

The Marine and Coastal Access Act (2009) sets out the requirement for the developer to obtain a Marine Licence for the elements of the Project which are to be constructed below Mean High Water Springs (MHWS). An application for a Marine Licence would be submitted to the regulator for consideration. A separate Environmental Statement would be provided to support the Marine Licence application. The elements of the Project which will require a Marine Licence include:

- the breakwaters;
- the Marine Off-Loading Facility (MOLF);
- dredging activities; and

- the cooling water intake and outfall.

Engagement and data-sharing will continue with the following organisations to help define the scope and methodologies:

- NRW
- North Wales Wildlife Trust
- Cofnod – North Wales Environmental Information Service
- Centre for Environment Fisheries & Aquaculture Science (CEFAS);
- IACC
- RSPB
- Local interest groups (e.g. those interested in harbour porpoises, seals, otter etc)
- Seawatch Foundation
- MarLIN (Marine Life Information Network).

Analysis and updating of the marine ecology and benthic sediment surveys will continue, in order to characterise the marine ecological conditions of the north Anglesey coast in the context of the proposed Power Station and its associated potential environmental effects. The assessment of effects and mitigation suggestions will also be informed by modelling of various marine parameters. These include:

- water levels, currents, and evaluation of shear stresses
- thermal (plume and long term accumulation of heat)
- TRO modelling
- dilution assessment
- water quality
- sediment transport
- radioisotopes and other possible contaminants with reasonably well defined fate processes
- wave and storm surge (possibly tsunami) modelling.

17 Archaeology and Cultural Heritage

17.1 Introduction

This chapter describes the existing baseline environment for the archaeology and cultural heritage topic and the potential effects associated with the proposed activities within the Wylfa Newydd Development Area.

Archaeology and cultural heritage, as used here, is synonymous with the term historic environment and has been considered under the three sub-topics of archaeological remains (terrestrial and marine), historic buildings and the historic landscape. Individual or groups of archaeological remains, historic buildings and historic landscapes are known as heritage assets which are defined by the NPS EN-1 as "*…those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest*".

17.2 Existing Environment

The archaeological and cultural heritage baseline has been established based on the results of desk-based surveys, walkover surveys and site inspections, archaeological geophysical surveys, archaeological interpretation of marine and terrestrial geophysical surveys and limited archaeological trial trenching.

Further archaeological surveys are scheduled for the proposed Off-Site Power Station facilities and will be presented in the environmental statement supporting the DCO application.

The archaeology and cultural heritage baseline has been considered under three sub-topics: archaeological remains (terrestrial archaeology and marine archaeology), historic buildings, and historic landscape. The study area for terrestrial archaeology, historic buildings and the historic landscape was defined as a circular area with a 6km radius extending from the centre point of the Existing Power Station. The study area for marine archaeology was defined as an area approximately 4.5km wide and extending up to 2km from the north Anglesey coastline. These study areas are shown on figures 17.1 and 17.2 respectively.

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	WN03.03.01-S5-PAC-REP-00004	Issue date:	15/03/2016

Figure 17.1: Location of archaeological remains

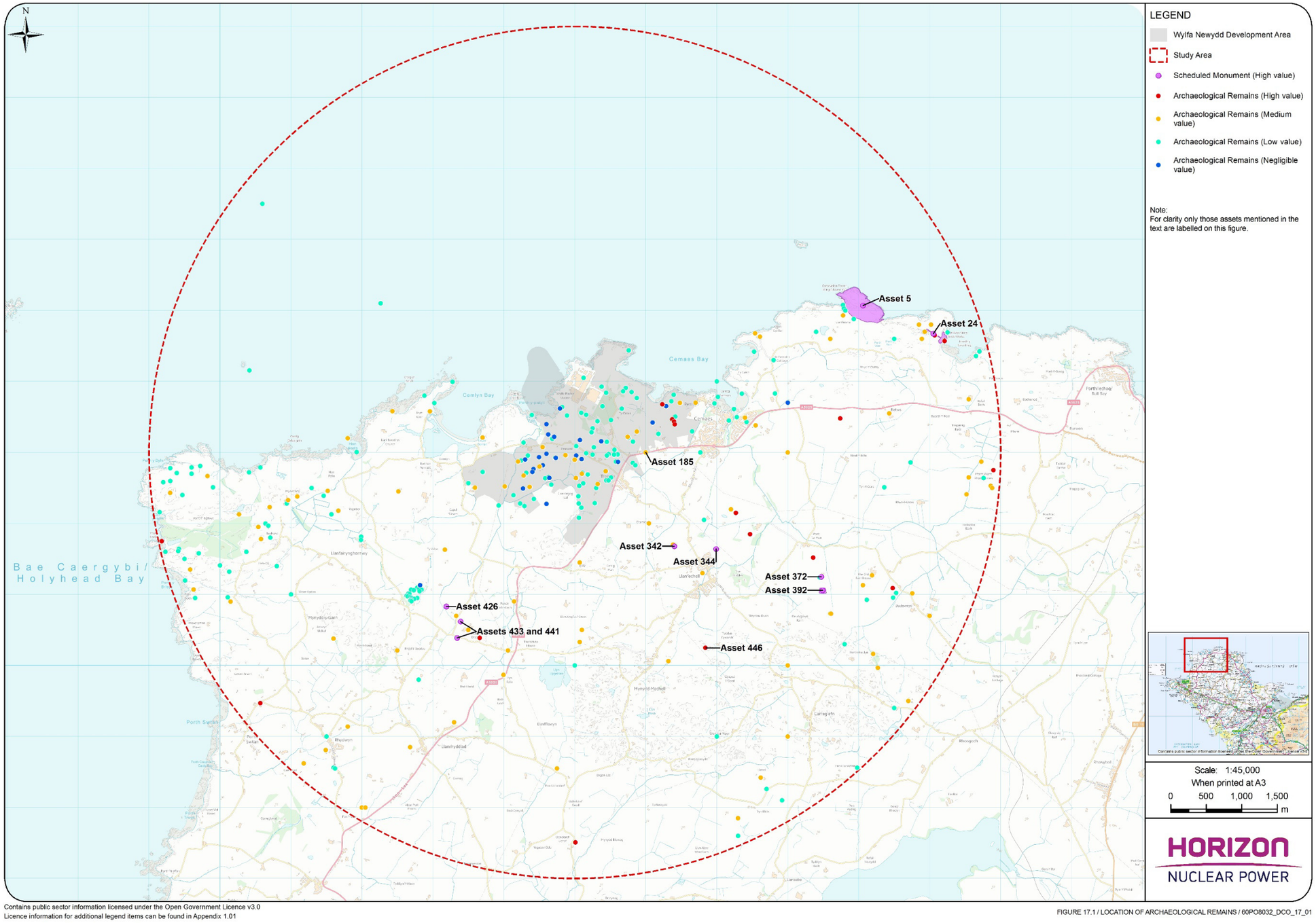

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FIGURE 17.1 / LOCATION OF ARCHAEOLOGICAL REMAINS / 60PO8032_DCO_17_01

17.2.1 Terrestrial archaeological remains, historic buildings and landscape

A total of 527 heritage assets have been identified within the study area for terrestrial archaeology, historic buildings and the historic landscape. The historic landscape has been divided into a number of historic landscape types (HLTs). The Amlwch and Parys Mountain Registered Landscape of Outstanding Historic Interest in Wales (HLT16) is located outside the study area for terrestrial archaeology and cultural heritage, however, due to the potential for effects on its setting it has been included in the terrestrial archaeology and cultural heritage baseline. The total number of heritage assets considered as part of the baseline is therefore 527 comprising 314 archaeological remains, 197 historic buildings and 16 HLTs. Designated heritage assets are presented in table 17.1 below.

Table 17.1: Summary of designated heritage assets

Name and Reference Number	Designation	Value
Dinas Gynfor Prehistoric Promontory Fort (AN038	Scheduled Ancient Monument	High
Porth Wen Post Medieval Brickworks (AN109)	Scheduled Ancient Monument	High
Prehistoric Standing Stones at Llanfechell (AN030)	Scheduled Ancient Monument	High
Prehistoric Standing Stone north of Llanfechell (AN080)	Scheduled Ancient Monument	High
Pen y Morwydd Prehistoric Round Barrow,Mechell (AN110)	Scheduled Ancient Monument	High
Prehistoric Earthwork Enclosure at Llifad) (AN079)	Scheduled Ancient Monument	High
Castell Crwn, Medieval Defended Enclosure atLlanrhwydrys (AN029)	Scheduled Ancient Monument	High
Prehistoric Standing Stones North and South ofPen yr Orsedd, Llanfairynghornwy (AN081)	Scheduled Ancient Monument	High
St. Mary's Church, Llanfairynghornwy	Grade I Listed Building	High
St. Padrig's Church, Llanbadrig (	Grade II* Listed Building	High
Felin Gafnan Corn Mill at Porth y Felin	Grade II* Listed Building	High
St. Rhwydrys Church, Llanrhwydrys	Grade II* Listed Building	High
Caerau House, Llanfairynghornwy	Grade II* Listed Building	High
St Mechell's Church, Llanfechell	Grade II* Listed Building	High
Plas Bodewryd, Llanfechell	Grade II* Listed Building	High
51 Grade II Listed Buildings	Grade II Listed Buildings	Medium
Cemaes Bay	Conservation Area	Medium
Llanfechell	Conservation Area	Medium
Cestyll Garden Grade II Registered Historic Park and Garden of Special Historic Interest in Wales.	Grade II Registered Historic Park and Garden of Special Historic Interest in Wales.	Medium
Amlwch and Parys Mountain	Registered Landscape of Outstanding History	High

While the location of the crash sites of a Bristol Beaufighter VI X8194 (Asset 185) is unknown, the grid references provided by the National Monument Record of Wales places the crash site within the Wylfa Newydd Development Area. Any remains of this aircraft that survive would be designated as Protected Places under the Protection of Military Remains Act 1986.

17.2.1.1 Archaeological remains of high value

A total of 25 archaeological remains considered as part of the baseline have been assessed to be of High value. Four of these (Assets 96, 121, 127 and 131) are located within the Wylfa Newydd Development Area. These comprise geophysical anomalies interpreted as the remains of enclosures of potentially prehistoric date or associated features.

Outside of the Wylfa Newydd Development Area, there are nine Scheduled Ancient Monuments assessed to be of High value. These consist of a promontory fort of Iron Age date at Dinas Gynfor and Porth Wen brickworks, standing stones (Assets 342, 344, 433 and 441), a round barrow (Asset 372), an enclosure of prehistoric date (Asset 392) and Castell Crwn, a medievaldefended enclosure at Llanrhwydrys (Asset 426).

17.2.1.2 Historic buildings of high value

A total of 22 historic buildings assessed to be of High value have been identified within the study area for terrestrial archaeology, historic buildings and the historic landscape. None of these lie within the Wylfa Newydd Development Area.

These historic buildings include one Grade I Listed Building and six Grade II* Listed Buildings. The Grade I Listed church of St. Mary in Llanfairynghornwy,which dates from the 11th century AD, is located approximately 1.5km southwest of the Wylfa Newydd Development Area.

There are three Grade II* churches within the study area all dating from between the 12th and 13th centuries AD. The comprise St Mechell in the village of Llanfechell (Asset 369), St Padrig in Llanbadrig (Asset 26) and St Rhwydrys in Cemlyn Bay.

Two of the Grade II* Listed Buildings within the study area are country houses with attached estates. Plas Bodewryd in Bodewryd (Asset 425) is a late 15th century hall house and Caerau House in Llanfairynghornwy is a 17th century mansion house.

17.2.1.3 Historic Landscapes of High Value

The Amlwch and Parys Mountain Registered Landscape of Outstanding Historic Interest in Wales (Reference number HLW (Gw) 1) is located outside the study area to the east of the Wylfa Newydd Development. Due to its height above sea level the landscape has been included as there is the potential for distant views of the Wylfa Newydd Development Area from Parys Mountain, a prominent landform, approximately 150m above sea-level, which once formed the largest copper mine in Britain during the industrial period.

17.2.1.4 Archaeological remains of medium value

Within the study area for terrestrial archaeology, historic buildings and the historic landscape, 99 archaeological remains assessed to be Medium value have been identified, 18 of these are located within the Wylfa Newydd Development Area including the potential crash site of a Bristol Beaufighter VI X8194 aircraft (Asset 185).

17.2.1.5 Historic buildings of medium value

Within the study area for terrestrial archaeology, historic buildings and the historic landscape 77 historic buildings assessed to be of Medium value have been identified. Cafnan House (Asset 181), is a two-storey Georgian house located in its own walled gardens with associated outbuildings and barns. This heritage asset was first mentioned in estate records from AD 1631 and is located within the Wylfa Newydd Development Area.

Of the other historic buildings assessed to be of Medium value, 51 are Grade II Listed Buildings. None of these are located within the Wylfa Newydd Development Area, the two closest are the former corn drying house at Felin Cafnan (Asset 141) and Grade II Listed Mill house at Felin Cafnan, Cylch-y-Garn (Asset 144). These two buildings, which are owned by the National Trust, are located approximately 160m and 200m respectively, west of the Wylfa Newydd Development Area.

Part of Cemaes, a village to the east of the Wylfa Newydd Development Area, is a Conservation Area (Asset 124). The Conservation Area is located to the southwest of Cemaes harbour along the River Wygyr, and contains one Grade II Listed Building. The overall character and appearance of the area is dominated by Victorian vernacular architecture, typified by two-storey double-fronted detached fishermen's cottages and short terraces.

Part of Llanfechell, a village located between two low hills to the southeast of the Wylfa Newydd Development Area, is also a Conservation Area (Asset 371). The Conservation Area contains St Mechell's Church (Asset 369), a Grade II* Listed Building, and five Grade II Listed Buildings around a market square surrounded by common land.

17.2.1.6 Historic Landscapes of Medium Value

Four HLTs assessed to be of Medium value have been identified within the study area. These are summarised in table 17.2.

Table 17.2: Summary of Designated Historic Landscapes

Name and Reference Number	Designation/Description	Value
Cestyll Gardens PGW (Gd) 45 (ANG)(HLT13)	Grade II Historic Parks and Gardens of Special Historic Interest in Wales. Consisting of the Main Gardens, the Kitchen Garden, two Significant Views and the Essential Setting.	Medium
The Small Towns and Villages Historic Landscape Type (HLT 2)	Ribbon development along principal thoroughfares and contain chiefly single, or two-storey, vernacular housing with roughcast render and slate roofs.	Medium
Tre'r Gof (HLT14),	Wetland basin mire which has the potential for the presence of palaeoenvironmental material and/or archaeological remains	Medium
Existing Power Station Historic Landscape Type (HLT1) and Dame Sylvia Crowe's landscaping of Wylfa A Power Station (HLT 15).	Designed landscape is characterised by an undulating wooded landscape cut by paths and comprises two significant mounds (man-made drumlins) and a plantation of coniferous and broad-leaved trees extend around the southern and eastern sides of the	Medium

Name and Reference Number	Designation/Description	Value
	Existing Power Station.	

Cestyll Gardens, which originally formed part of the grounds of Cestyll House, are included as Grade II on the Register of Historic Parks and Gardens (GD45). The designated area includes the main garden, located to the west of the Wylfa Newydd Development Area, and the kitchen garden, which is within the Wylfa Newydd Development Area. The garden is notable for being informally planted with tender plants, well-suited to its location in a natural valley with a rocky coastal aspect. The remains of the walled kitchen garden are located to the south of Porth-y-pistyll. The Register of Historic Parks and Gardens records an 'Essential Setting' around the gardens and two 'Significant Views' looking out to sea from the main garden and the kitchen garden.

17.2.1.7 Archaeological remains of low or negligible value

Of the 190 archaeological remains identified within the study area for terrestrial archaeology, historic buildings and the historic landscape and assessed to be of Low or Negligible value, 87 are located within the Wylfa Newydd Development Area. These archaeological remains date from the prehistoric through to the post-medieval period.

17.2.1.8 Historic buildings of low or negligible value

Within the study area for terrestrial archaeology, historic buildings and the historic landscape 98 historic buildings assessed to be of Low or Negligible value have been identified. These buildings date mainly from the early 19th century to the 20th century and consist primarily of farmhouses and outbuildings, cottages and chapels. Development on Anglesey throughout the 20th and 21st centuries has tended to reduce the number of unaltered examples of vernacular architectural forms in the study area, primarily through demolition, extension and alteration.

Thirty-six of these building are located within the Wylfa Newydd Development Area. These include post-medieval and modern standing buildings such as the limekiln at Porth-y-pistyll (Asset 106), the former gatehouse for Simdde Wen (Asset 170) and the former Coast Guard look-out station (Asset 42) on Wylfa Head.

17.2.1.9 Historic landscapes of low or negligible value

A total of 11 HLTs of Low or Negligible value have been identified within the study area for terrestrial archaeology, historic buildings and the historic landscape.

The dominant element of the historic landscape within Wylfa Newydd Development Area is the modern the Existing Power Station (HLT1), which was constructed in the 1960s, with associated landscaping designed by the renowned landscape architect Dame Sylvia Crowe. The landscaping around the Existing Power Station consists of two large mounds designed to emulate the natural drumlins with extensive, largely coniferous, tree planting extending around the southern and eastern sides of the Existing Power Station. The design was an innovative solution to the problem of both screening a major industrial development and integrating it into the landscape of Anglesey by softening most views from the semi-open landscape to the south and east.

Apart from the settlements of Cemaes and Llanfechell, the undesignated historic landscape types within the study area are largely agricultural in origin and are characterised by fields used

for pasture that are enclosed by dry-stone walling. These fields were predominantly enclosed in the late 18th, 19th and 20th centuries.

17.2.1.10 Potential for unknown terrestrial archaeological remains

While there are some archaeological remains that are difficult to identify without archaeological trial trenching, the results of the desk-based surveys, geophysical surveys, trial trenching and watching briefs provide a good understanding of the baseline Wylfa Newydd Development Area. Based on this information the potential for unknown archaeological remains has been assessed to be low.

17.2.2 Marine archaeological remains

A total of 67 archaeological remains comprise the baseline for marine archaeological remains comprising 18 named wreck sites, four unnamed wrecks, one aircraft crash site and 44 geophysical anomalies were identified as being of uncertain origin but potentially of archaeological interest. The locations of these marine archaeological remains are shown on figure 17.2.

Figure 17.2: Location of marine archaeological remains.

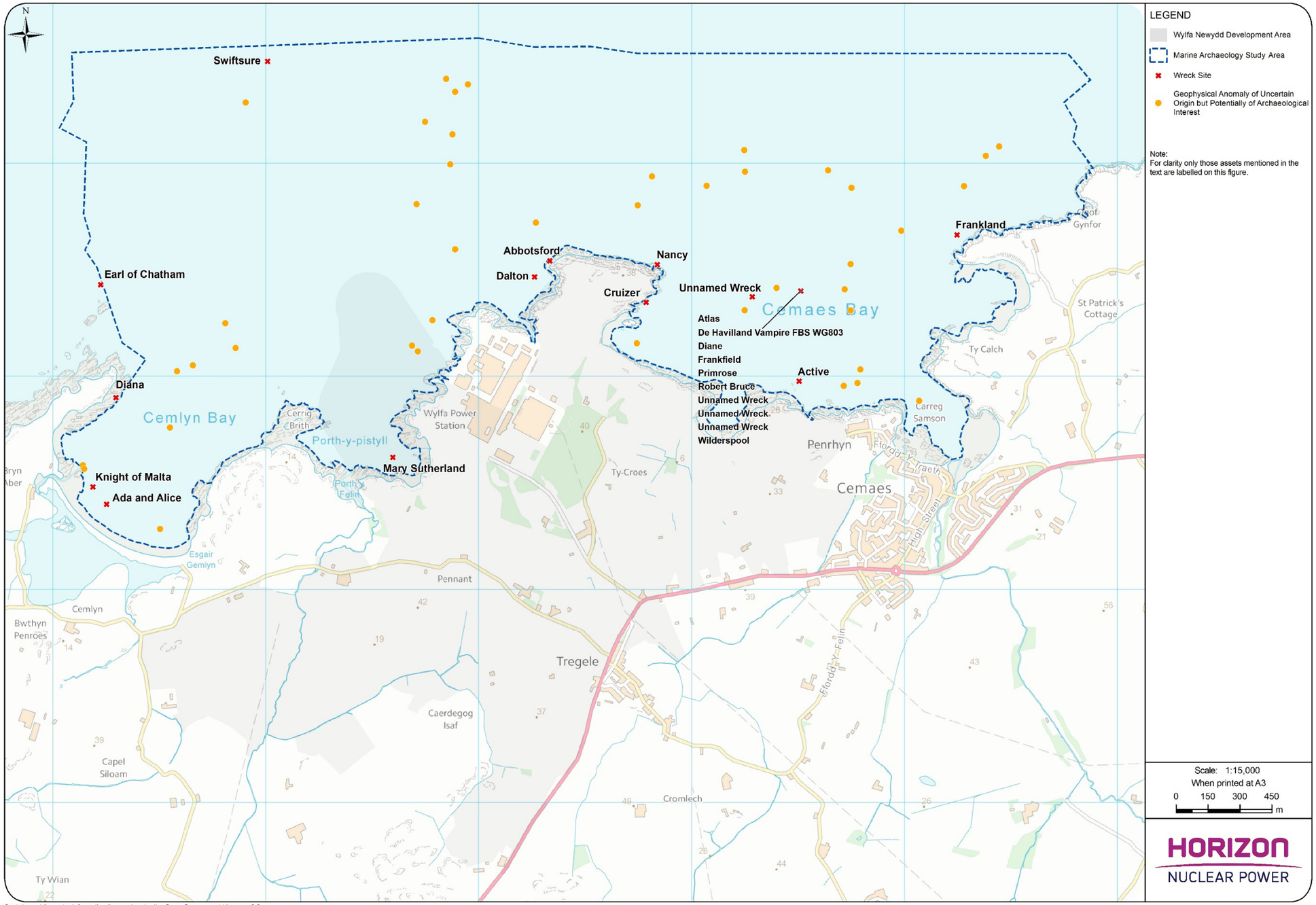

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FIGURE 17.2 / LOCATION OF MARINE ARCHAEOLOGICAL REMAINS / 60PO8032_DCO_17_02

17.3 Potential Effects and Mitigation

17.3.1 Potential Onshore Effects during Construction and Operation

The principal onshore effects on archaeological remains, historic buildings and historic landscapes within the Wylfa Newydd Development Area will arise from the construction works, enabling works and site clearance works including the levelling of the site and earthworks. The demolition of standing buildings as part of the enabling works will result in the loss of a number of historic buildings. The site clearance works and soil stripping would have a major impact on any surviving archaeological features both above and below ground.

Demolition of existing buildings within the Wylfa Newydd Development Area would remove 34 undesignated historic buildings; 29 of these buildings have been assessed to be of Low value and five buildings have been assessed to be of Negligible value. Archaeological building investigation and recording of all 34 buildings is proposed. Given the lack of complexity of these building this it is considered to be highly effective mitigation.

There will also be a major effect on the Cestyll Gardens Registered Historic Park and Garden resulting from the removal of the kitchen garden and associated structures within the Wylfa Newydd Development Area. During construction there will be a temporary effect on the Essential Setting of Cestyll Gardens from the associated construction activities. Proposed construction activities would remove part of Dame Sylvia Crowe's landscaping of Wylfa A Power Station (HLT 15).

The potential for effects on the settings of heritage assets has been assessed through the use of the Landscape and Visual Impact Assessment (Chapter 10). The Zone of Theoretical Visibility indicates there will be the potential for visual effects on the setting of Scheduled Monuments and archaeological remains assessed to be of High value.

The proposed activities would also have the potential to affect the settings of designated heritage assets in particular Cestyll Gardens and its significant views out to sea and the settings of the Felin Gafnan Corn Mill (a Grade II* Listed Building), the Grade II Listed former corn drying house and the Grade II Listed former Mill house.

17.3.2 Potential Offshore Effects during Construction and Operation

The principal offshore construction effects on marine archaeological remains will arise from the construction of the breakwater and MOLF, especially any dredging and blasting activities. The construction activities have the potential to remove any surviving remains of the wreck of the Mary Sutherland as well as unknown archaeological remains in the marine environment.

17.3.3 Mitigation

The archaeological and cultural heritage assessment will be iterative, whereby mitigation measures identified as required in early assessments will be incorporated into the design of the Proposed Activities and will inform the appropriate Environmental Management Plan for construction, reducing the potential for significant effects. As part of the EIA process, the following types of mitigation will be considered to address identified effects:

- Input into the construction programing and design of structures in order to preserve heritage assets or minimise the effects of construction and operation;
- Input into the design of structures in order to reduce visual effects through the use of suitable materials and design finishes;
- Design of haul routes to reduce effects on heritage assets;
- Sensitive siting of construction compounds to reduce effects on heritage assets;
- Implementation of site policies to minimise lighting outside core working hours and minimising light spillage and glare through the selection of light fittings and directional lighting;
- Informed by non-invasive and invasive evaluation where required, undertake archaeological recording in advance of or during construction, followed by a programme of assessment, reporting, analysis and publication commensurate with the value of the archaeological remains removed, submission of reports to the Historic Environment Record and National Monument Record of Wales and the preparation and submission to an appropriate repository of an ordered archive;
- Preservation of historic buildings and/or their settings by record in advance of development through a programme of recording and reporting commensurate with the value of the historic buildings impacted, submission of reports to the Historic Environment Record and National Monument Record of Wales and the preparation and submission to an appropriate repository of an ordered archive;
- Preservation of historic landscapes by record in advance of development through a programme of recording and reporting, submission of reports to the Historic Environment Record and National Monument Record of Wales and the preparation and submission to an appropriate repository of an ordered archive;
- Compensatory mitigation through relocation or recreation of the elements of Cestyll Garden Registered Historic Park and Garden (HLT13) that would be impacted by the Power Station;
- Implementation of the LEMP; and
- Following best practice guidance to minimise dust to prevent accidental damage to Cestyll Garden Registered Historic Park and Garden (HLT13).

17.4 Proposed Scope, Methodology and Criteria

The methodology adopted for assessing potential environmental effects on the archaeological and cultural heritage baseline environment is set out in Chapter 7.

17.4.1 Study Area

The onshore and offshore study areas for archaeology and cultural heritage are illustrated in figure 17.1 and 17.2. The onshore study area, which was established for the collection of the baseline data, is defined as a circle with a 6km radius extending from the centre point of the Power Station Site. The offshore study area is defined as an area extending up to 2km from the Wylfa Head coastline.

17.4.2 Assessment methodology

The methodology used has built on the guidance set out in NPS EN-1, which states that the level of detail of the cultural heritage assessment should be proportionate to the importance and significance of the assets assessed. The more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. It also states that any effect on the significance of a designated heritage asset, including substantial harm, should be weighed against the public benefit of development.

The NPS EN-1 requires that applicants should provide a description of the value of the heritage assets affected by the proposed development and should include descriptions of the value of heritage assets affected by the proposed development with details of the contribution of their settings to that value.

The baseline information that is currently available will be reviewed as the design of the proposed activities progresses. Since receipt of the Scoping Opinion in April 2010, the archaeological and cultural heritage baseline information for the Wylfa Newydd Development Area and Off-Site Areas has been gathered from a series of non-intrusive surveys and limited intrusive surveys. The surveys undertaken included desk-based studies, walkover surveys, onshore and marine geophysical surveys and limited intrusive test trenching.

Before works that disturb the archaeological bearing soil horizons take place at a development site Regulations require that the archaeology and cultural heritage potential of the site is established, that archaeological sites and their significance are identified and if required preserved before works take place. Horizon, in agreement with the Archaeological Curator (GAPS), is undertaking the investigations required to satisfy these requirements before works commence under Site Preparation and Clearance. As a result the potential impacts to archaeological remains within the Wylfa Newydd site will have been identified and mitigated prior to commencement of works under the DCO.

The value of known archaeological and cultural heritage assets will be assessed using professional judgement informed by criteria developed based on the sum of the heritage interests that a heritage asset holds, whether above ground, below ground or within the marine environment.

The significance of effect will be determined based on the value of the heritage assets and the magnitude of change, and will be derived using professional judgement guided as necessary by the significance matrix as set out in chapter 7.

17.4.3 Assessment Criteria

The method for the assessment of value, magnitude and significance of impact has been informed by the assessment process set out in the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011) and The Setting of Heritage Assets (English Heritage 2015).

The cultural heritage inputs to the environmental statement will be prepared in line with NPS EN-1, the Chartered Institute for archaeologists' (CIfA) Code of Conduct (2014) and Standard and Guidance for Historic Environment Desk-based Assessment (2014).

18 Socio-economics

18.1 Introduction

This chapter describes the current baseline environment for socio-economic features, and the potential socio-economic impacts associated with the Power Station development.

The term 'socio-economic effects' covers different impact types. These can be largely defined as 'social impacts' referring to the consequences to local populations in terms of ways in which people live, work and interact; and 'economic effects' which include issues such as employment, impacts on certain economic sectors (e.g. such as tourism) and impacts associated with increased spending within a local area. The Wylfa Newydd Project will require a number of jobs through the phases of construction, operation and decommissioning. During construction there will be a peak of people and skills required and an important element of the socio-economic assessment is to identify opportunities to maximise benefits to the local community, where possible through all the project phases.

18.2 Existing Environment

The baseline presented here first covers the local population and labour composition and discusses other economic evidence based data, including specifically the tourism industry. It then goes on to present information on the social evidence base to support the consideration of social-related impacts.

Defining the spatial scope for socio-economic assessment can be complex because of the wide range of receptors and the different ways they might be affected.

In addition, socio-economic baseline data are often reported over a range of spatial scales (e.g. super output areas, wards and local authority administrative boundaries). The need to assess and compare data at a detailed level but also at a higher (regional/national) level means a range of spatial scopes have been selected throughout the assessment, depending on the topic area.

The study areas are defined in table 18.1 in section 18.4 below. Study areas include the Daily Construction Commuting Zone (DCCZ) and the Key Study Area (KSA). Key data sources are the Census 2011 data[30] and information presented on the North Wales Economic Observatory.[31]

18.2.1 Skills and Local Labour

18.2.1.1 Population

In 2011, Anglesey had a resident population of around 70,000, comprising 19% of the DCCZ population (total: 376,000) and just over 2% of the population of Wales (total: 3,063,000). The working age population (those aged between 16 and 64) provides an indicator of the capacity of

[30] https://www.nomisweb.co.uk/census/2011

[31] http://nwef.infobasecymru.net/IAS/

the population to participate in economic activity. The working age population on Anglesey and within the DCCZ is roughly 61%, slightly less than the Welsh average of 63%. Census 2011 data also reveal that people aged 65 and over comprise a slightly greater proportion of the population on Anglesey and the DCCZ compared to Wales as a whole. The main population concentrations are in the towns of Holyhead, Llangefni and Amlwch, along with settlements around the crossing points for the Menai Strait. Anglesey has the smallest resident population of all counties in North Wales.

Population migration is relevant to the local economy because, not only does it have a bearing on the ultimate size of the local labour supply for any major project, but it has social implications which could be exacerbated or mitigated via change resulting from a major project.

Migration data for Anglesey shows a peak inflow during 2004 to 2005 before net migration started to decline, becoming negative over the period 2008 to 2011. The reasons for this decline are likely to include closure of key industrial sites such as Anglesey Aluminium in 2009. The population on Anglesey is expected to continue to decline, falling by 3% over the period to 2036 (final forecast year), whilst the population of North Wales is expected to grow by 5% and the overall Welsh population is expected to increase by 7% by 2036.

18.2.1.2 Employment

Rates of economic participation, including the employment rate, the unemployment rate and the rate of economic inactivity on Anglesey and in the DCCZ do not differ significantly from the national averages for Wales. Anglesey's employment rate fell below that of Wales and North Wales from 2007 to 2009. Thereafter the employment rate exceeded the Welsh average until the 2013 to 2014 period. The employment rate has fallen over the last 12 months on Anglesey reflecting employment losses on the island. The average employment rate on Anglesey as reported in the Annual Population Survey by NOMIS was 69% (equivalent to 28,557 full time equivalents) over the period 2007-2014. The average during this period for Wales was approximately 68% (equivalent to 1,278,785 full time equivalents).

Around 7,100 full time equivalent construction jobs are identified within the DCCZ, 2,200 of them (31%) are associated with workplaces on Anglesey. Prior to the announcement of the Project, projections supporting the North West Wales Labour Market Study (2010) expected that employment in construction would not return to pre-recession levels until 2020.

In terms of sectors of employment, Anglesey has seen a change in its industrial structure in recent years. Key changes on Anglesey include a 22% increase in employment in accommodation and food service activities between 2009 and 2013, in contrast to a more modest increase of 7% in both the DCCZ and Wales. The manufacturing sector on Anglesey has seen a 25% reduction in its share of employment, in contrast to a 1% decline across the DCCZ and an increase of 3% in Wales.

Population growth is a significant factor in determining future economic growth. Whilst Wales and North Wales are expected to see population growth over the 2015 to 2036 period, Anglesey's population is forecast to decline by 3%.

18.2.1.3 Skills and qualifications

Census data show that, in general, the working age population on Anglesey and in the DCCZ are more highly skilled than the Welsh population as a whole. In terms of occupational skills, Anglesey's resident workforce contains a relatively higher proportion of people working in high-level skilled occupations (42.4%) compared to the rest of Wales (39.7%). The DCCZ has an even higher proportion at 44.6%.

The percentage of the working age population of Anglesey with an NVQ Level 4+ is 26.1% compared to a Welsh average of 24.5%. The proportion for the DCCZ as a whole is 25.3%, slightly lower than Anglesey, but above the Welsh average. The proportion of the workforce with NVQ Level 3 qualifications is broadly similar across Anglesey (11.9%), the DCCZ (12.5%) and Wales (12.3%).

The qualifications profile of the DCCZ in 2011, shows nearly one-quarter (25%) of residents have no formal qualifications compared to around 26% for Wales as a whole. The proportion of Anglesey residents with no formal qualifications (24.2%) is broadly in line with the rest of the DCCZ and below the Welsh average.

There are around 61,800 workers within the DCCZ classified as working in a nuclear-relevant occupation. This is based on work undertaken by the Construction Skills Network (Construction Skills Network, 2012) which attempted to codify nuclear-relevant skills in terms of generally accepted classification systems for occupational data.

18.2.2 Accommodation and distribution of workers

The baseline presented here is focused on the KSA as this is the area where effects on the accommodation stock are most likely to occur.

The total number of dwellings on Anglesey has grown at an average rate of less than 1% between 2000 and 2013. The population on Anglesey is expected to decline by 3% over the period 2015 to 2036. However, it is likely that housing demand will increase particularly for one-bedroom and smaller properties to accommodate an ageing population. Therefore, it seems unlikely that current housing stock supply will be able to meet future demand.

There were 57,131 households in the KSA in 2011, the most recent year for which data are available. The total number of households on Anglesey in 2014 was 30,943 with around 45% of these located within Anglesey South. Approximately two-thirds of all households are owner-occupied, with residents either owning their homes outright or paying a mortgage on them.

Owner occupation remains the dominant tenure followed by the private rented sector (including those living rent free) and social rented sector.[32] There is a relatively high proportion of second homes within the KSA, with Gwynedd ranked fourth across England and Wales and Anglesey ninth, in terms of non-residents with a second address within the local authority.

The opportunities presented by non-home based workers may encourage property owners to bring forward previously empty properties for occupation. The evidence on empty properties comes from the work undertaken to support the emergent local plan for the Anglesey and

[32] Nomis: Census – Tenure, Households (QS405EW)

Gwynedd JLDP. There were 699 empty properties on Anglesey in 2012, but this had increased to 855 by 2014. The opportunities created by the Wylfa Newydd Project may act as a stimulus to build new houses for sale to workers especially those likely to stay for an extended period. The number of new homes being built on Anglesey fell by 18% between 2008 and 2013; however, this is a smaller decline than across Wales as a whole (23%).

Analysis suggests there could be 21,400 bed spaces available in the KSA based on 2011 stock levels (the most recent year for which data are available). It is thought that properties let through private landlords and letting agents are the most likely to be available to workers. However, it is possible that workers might experience barriers in accessing this accommodation. For instance landlords may have a specific preference for a type of tenant which does not fit the construction worker profile. Some landlords may have a preference for 'young professionals' or cater to tenants on Housing Benefit. Other landlords might not find construction workers an attractive prospect because of certain business objectives. Similarly, some accommodation will be let on an informal basis to friends and relatives for non-economic reasons.

These cases highlight circumstances where accommodation classed as 'private rented' would not be available to non home-based workers. However, specific information on the types and levels of such restrictions within the KSA is not available.

18.2.3 Supply Chain and Business

18.2.3.1 Economy

Gross value added (GVA) is a measure of the size of the economy of an area, and is sourced from Regional Accounts (from the Office for National Statistics (ONS)). It is measured at the NUTS3[33] level, which is a European Union geography representing local economies either as individual authorities or as small groups of local authorities. Anglesey took a 1.5% share of total Welsh GVA in 2013, marginally lower than the 1.7% share in 2008. It is the smallest economy of all the Welsh NUTS3 areas. The economies of Gwynedd and of Conwy and Denbighshire are larger than Anglesey's, and these three areas together accounted for 11.7% of Welsh GVA in 2013.

Over the 2008 to 2013 period, Anglesey's GVA rose by 2.4%, in contrast to growth of 11.9% for Wales as a whole, the shortfall being partly due to the closure of Anglesey Aluminium in 2010.

In 2013, GVA per head on Anglesey was £11,368, well below the £16,893 for Wales and the £23,755 for the UK as a whole. This is partly explained by the relatively high level of out-commuting for Anglesey.

In terms of industry, Anglesey has above Welsh average shares in agriculture, forestry and fishing & wholesale, retail, transport, hotels and food suggesting a strong dependence on agricultural and tourism-related businesses within Anglesey. In contrast, production and real estate activities are relatively less important for Anglesey's economy than elsewhere in Wales.

[33] Nomenclature of Units for Territorial Statistics is a hierarchical classification of administrative boundaries. NUTS3 refers to an administrative level comprising countries or groups of unitary authorities with a population size ranging 150,000 to 800,000.

Anglesey has a higher proportion of local business units in the construction sector compared to other council areas.

The ability of an area to sustain and generate enterprises is an indicator of the general economic vitality of the area. Within Anglesey and Gwynedd there are a higher proportion of sole proprietors and partnerships, and a lower proportion of companies, likely to reflect the high proportion of agricultural units.

In 2013, there were 481 active businesses per 10,000 population on Anglesey, above the Welsh average of 466, but lower than the 523 for North Wales as a whole. The business counts for Anglesey in 2013 highlights the importance of the agriculture, forestry and fishing sectors. Construction and wholesale, retail and trade, are also major contributors in terms of numbers of businesses.

The classification of Anglesey as an enterprise zone for energy is expected to assist with the growth of certain sectors, including production and energy.

18.2.3.2 Labour Market

Employment rates provide a measure of the extent to which labour resources are being used in a local economy. They offer an insight into the available headroom to accommodate growth and are therefore relevant considerations for this project. In the short term, these rates are sensitive to the economic cycle, but in the longer term they are also significantly affected by government policies with regard to higher education and welfare support and by policies that facilitate employment of women.

The employment rate is defined as the percentage of the resident working age population that is in employment, and is sourced from the Annual Population Survey which is published by the ONS. Employment influences a range of factors including income, access to housing, education, services and social networks. The employment rate on Anglesey is 69.4%. The Office for National Statistics data shows the employment rate in the wider North Wales area to be 71.6% is in line with that of Wales 69.5%.

Economic activity rate is the percentage of the population, both employed and unemployed, which constitute the manpower supply of the labour market regardless of their current labour status. At around 75%, the economic activity rates for the Isle of Anglesey and the DCCZ are broadly in line with national Welsh rate. In 2014, the unemployment rate for Anglesey was 7%, slightly lower than the 7.4% for Wales, but the rate for Gwynedd, at 6.1%, was significantly lower.

The proportion of the working population claiming out of work benefits on Anglesey fell from 13.7% in May 2011 to 11.8% in May 2014, substantially below the 13.0% for Wales as a whole.

The job density rate – the number of filled jobs divided by the working age population – for Anglesey has improved in recent years, but at 0.62 in 2012 it was still much lower than in Wales (0.71) and North Wales (0.75).

There has been no significant growth in earnings on Anglesey since 2008, in contrast to other parts of North Wales. In 2014, median weekly earnings on Anglesey were £445 compared to £516 in Gwynedd and a Welsh average of £480.

Gross Disposable Household Income (GDHI) is a measure of the amount of money individuals have available for spending or saving. It generally provides a more reliable indicator of living standards across different areas as it is based on where people live rather than where they work. GDHI is sourced from Regional Accounts which are produced by the ONS. In 2012, GDHI on Anglesey was £15,022, above the Welsh average (£14,623) and the sixth highest across Welsh local authorities. In 2013 GDHI fell across the board, although the figure for Anglesey remained above the Welsh average.

Just over 10% of the working age population on Anglesey work in agriculture and fishing, double the proportion for Wales and higher than the 7% across the DCCZ as a whole. The proportion employed in the construction industry (7%) is also higher than in the DCCZ (6%) and Wales (5%).[34] Utilities employment on Anglesey is 3.7%, above the Welsh average of 1.7%, reflecting the presence of the existing Magnox reactors.

Based on the findings of the Welsh Skills Survey 2011, across North Wales 10% of establishments reported that they had a vacancy, and 3% reported a “hard-to-fill” vacancy, compared to 12% and 4%, respectively, for Wales.

Commuting patterns offer a valuable insight into the relative mobility of labour and the role played by certain areas in supporting economic activity across a wider hinterland than that suggested by their administrative borders. The 2011 Census produces an analysis of journey to work movements. In 2011, nearly 8,900 Anglesey residents were travelling to workplaces off the island, whilst slightly over 3,100 people were travelling on to the island for work. The average distance travelled to work for residents within the DCCZ is around 12 miles, higher than the Welsh average (10.4 miles) but lower than for Anglesey (14 miles).

18.2.4 Public Services

Public sector provided nursery provision (provided at primary school locations) on Anglesey are largely oversubscribed. For primary and secondary education, there is capacity in terms of overall levels of provision, particularly within Anglsey South and the Menai Mainland. There are 48 primary schools on Anglesey and 40 in the Arfon area of Gwynedd. Across the KSA there is excess capacity of approximately 1,900 places as of 2015. There are five secondary schools on Anglesey and six in the Arfon area of Gwynedd. Across the KSA there is excess capacity of approximately 2,400 places as of 2015.

There are 23 GP surgeries in the KSA; 11 on Anglesey and 12 in Menai Mainland. These surgeries have a total of 102 GPs, split almost equally on and off Anglesey. They serve 132,945 registered patients, again almost evenly split on and off Anglesey. This is considered below both the UK benchmark of 1,800 patients per GP and the Welsh benchmark of almost 1,600 patients per GP. However, one surgery fails to meet the UK benchmark and four other fail to meet the Welsh benchmark. These are all located on Anglesey. Hospital services for KSA residents are provided by Ysbyty Gwynedd in Bangor.

There are 20 dental practices in the KSA providing services to NHS patients (12 on Anglesey and eight in Menai Mainland) with a total of 31 dentists. Patient enrolment waiting lists are

[34] ONS: Business Register and Employment Survey (BRES)

between one month and two years, suggesting that existing practices are oversubscribed. The patient to dentist ratio in the Betsi Cadwaladr University Health Board area is higher than the Welsh average ratio but lower than the UK average.

There are a number of leisure and recreation facilities in the KSA, including ten libraries and five leisure centres on Anglesey.

There is the provision of emergency services throughout the KSA, with four police stations and ten fire stations. Of these ten fire stations seven are located on Anglesey and three are within Menai Mainland. The North Wales Fire and Rescue Service employs around 1,000 staff in operational and support roles across the North Wales region.

18.2.5 Tourism

The 2015 State and Outlook on the European Environment Report confirm that tourism and environment have a multifaceted and mutual relationship. As one of the ever growing economic sectors in the last decades, despite the most recent worldwide financial crises, tourism continues to develop.

In 2013, the total revenue generated by tourism on Anglesey was estimated to be around £256m, a 4.4% increase on 2012. The total number of visitor days also increased to 5.32m. It is estimated that tourism activity supported around 3,100 jobs on Anglesey in 2012, equivalent to approximately 10% of employment on the island. A further 800 indirect jobs are estimated as a result of supply chain activity. The greatest proportion of employment is attributed to accommodation..

There is a substantial local supply of tourist accommodation in the KSA with an estimated 48,000 bed spaces in total. However, the tourism bed stock on Anglesey decreased by almost 9% between 2008 and 2011, with falls in self-catering accommodation and camping accommodation. The number of businesses which are quality assured by Visit Wales has fallen from 204 in 2008 to 116 in 2011.

18.2.6 Social Cohesion and Lifestyle

The ONS undertakes annual surveys into personal well-being estimates based on data from the Annual Population Survey (APS) that includes responses from around 165,000 people. This provides a large representative sample of adults aged 16 and over living in residential households in the UK. The survey of personal well-being shows that Anglesey residents, on average, have a higher overall life satisfaction than across Wales and the rest of the UK.

Welsh Index of Multiple Deprivation is the Welsh Government's official measure of relative deprivation for small areas in Wales. The index shows that 2% of the Isle of Anglesey's areas fall in the 10% most deprived areas in Wales, compared to 10% of areas across Wales as a whole.[35]

The perception of crime in North Wales was investigated in 2009, finding that people's fear of crime is greater than is warranted. A fifth of respondents believed there was a 40% chance of becoming a victim of crime generally, whereas the actual rate was 3% according to the Police

[35] http://www.assembly.wales/NAfW%20Documents/anglesey.pdf%20-%2018042008/anglesey-English.pdf

Authority's mapping system. This would suggest there is a high fear/perception of crime in North Wales. Compared to the whole of England and Wales, the percentage of the population stating the police do an excellent/good job or deal with local crimes is lower in North Wales. This could have implications on the fear of crime amongst the resident population if there is a poor perception of police performance in the North Wales region.

The 2011 Census data of the demographic profile of the KSA shows very small numbers of people born outside the UK or Europe and very few being of non-white origin. This is broadly similar across the sub-areas within the KSA.

The Welsh language continues to have a strong presence on Anglesey. The 2011 Census data show that 45.6% of the population is able to speak, read and write in Welsh. This is the second highest rate in Wales, second only to Gwynedd (56%). The overall average in Wales is 14.6%. In recent years there has been a 6% decline in the number speaking Welsh on Anglesey, from 32,672 in 2001 to 30,756 in 2011. However, there are six lower super output areas (LSOAs) on Anglesey where the percentage of fluent Welsh speakers remains above 60%.

18.2.7 Land Use

Agricultural land is classified using the Agricultural Land Classification system. The grading system is 1 to 5 with the highest quality agricultural land classified at Grade 1. The Agricultural Land Classification data shows that the majority of agricultural land on Anglesey is of low grade (grade 3 and grade 4, with a smaller proportion in grade 5). There is no Grade 1 land on Anglesey, and only small areas of Grade 2 land, found in the east and south of the island.

The majority of the land in the KSA is coastal lowland, with a substantial presence of agricultural land, including small areas of arable farming and pastureland.

There are a number of designated areas within the KSA, including 206 sites of special scientific interest and 29 national nature reserves. There are also 52 historical conservation areas and 1 world heritage site.

A number of strategic development sites have been identified in the Anglesey and Gwynedd JLDP, linked to the Energy Island Programme for Anglesey. Around 300 hectares of land has been identified as either primary or secondary development sites within the KSA.

18.3 Potential Effects and Mitigation

There is potential for the Proposed Activities to effect (positively or negatively) on socio-economic aspects in the local and wider study areas. This assessment is based on a construction workforce that is anticipated to peak at between 8,000 and 10,000 workers, and an operational workforce of about 850 workers.

- Employment: Impact on employment (direct and indirect) and potential impact on existing industries or services as a result of worker shortages.
- Skills: Skill availability and training, mapped against the requirements associated with the Power Station Development.
- Supply chain and business: Impact from expenditure directly linked to the Power Station Development, both with regard to supporting local suppliers and the knock-on effects of

additional expenditure in the local economy, plus any loss of business as a result of the Power Station Development, for example from a loss of premises or land.

- Tourism: Impact on tourism businesses in terms of potential change in visitor numbers and the associated change in expenditure in the sector, impact on holiday accommodation availability from possible competition for bed spaces with construction workers, and long term effects on the tourism brand for Anglesey.
- Accommodation: Change in the availability and price of other housing stocks (private rented, owner occupier) that would be used to accommodate workers during construction and operation.
- Community resources: Effect on community facilities including local recreation centres (e.g. swimming pool and libraries).
- Public Services: Effect on schools and nurseries, health care facilities, police and emergency service provisions;
- Land use: Effect on agricultural land (e.g. loss of land and severance), development land, and commercial and industrial land (as appropriate).
- Lifestyle / residents: Social cohesion associated with the Power Station Development and the impact on local families/residents/stakeholders. This includes changes in perception of crime and the population demographic in the area.

A number of supporting strategy documents have been prepared (including for Jobs and Skills, Accommodation, Tourism and Education) that are intended to provide a means for effective implementation associated with both embedded and proposed mitigation measures associated with the plans.

18.4 Proposed Scope, Methodology and Criteria

Guidance set out in the NPS EN-1 and NPS EN-6 state that:

- applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies;
- any effects likely to have an impact at a local or regional level should be considered. This could include impacts on jobs and training, public services, tourism, the impacts of the workforce on local communities and community cohesion, and cumulative effects – especially on construction labour demand at a regional level (NPS EN-1);
- the assessment needs to identify local baseline conditions and how impacts relate to local policies (NPS EN-1); and
- the local and regional consequences of construction, operation and decommissioning should be accounted for in the assessment. Any mitigation must be related to what is deemed necessary to make the development acceptable in planning terms (NPS EN-6).

The assessment process used is designed to ensure that employment, community cohesion and well-being (as identified within NPS EN-1) along with potential pressures on local and regional resources, demographic change and economic benefits (as identified within NPS EN-6) are covered comprehensively. NPS EN-6 also recognises the positive effects for health and wellbeing resulting from the positive socio-economic benefits of new nuclear power stations.

18.4.1 Study Area

Defining the spatial scope for socio-economic assessment can be complex because of the need to consider communities and organisations within various catchment areas. These may be affected in different ways and by different combinations of socio-economic effects.

In addition, socio-economic information is reported over a range of spatial scales (e.g. super output areas, wards and local authority administrative boundaries). The need to have data available at a detailed level but also at a higher (regional/national) level means a range of spatial scopes have been selected for socio-economic assessment, depending on the topic area.

The study areas are defined below (see table 18.1). These relate to assessment of impacts associated with activities on the main site and at other development sites or Associated Development sites.

Table 18.1 Socio-economic assessment geographic scope

Area	Geographic Scope	Assessment Scope
Local Area of Influence	Approximately 5km from the proposed development site, or approximately 1km from other Associated Development sites. The exception is the temporary workers' accommodation for which a 5km boundary is adopted in consideration of the implications the local area of influence from the presence and use of the Temporary Workers' Accommodation. Neighbourhoods which fall on the boundary of these zones will be included within the assessment. The 5km zone has been selected to ensure that significant impacts on the physical environment (in terms of air, noise and visual assessment) are incorporated in the socio-economic assessment.	Issues impacting communities adjacent to or in close proximity to the proposed Wylfa Newydd site or other development areas. Topics include direct land use impacts, public service provision and community resource provision. This area will also be considered in the assessment of inter-relationships linked to air and noise assessments.
Key Socio-economic Study Area (KSA)	This area is considered to represent the area most likely to be impacted (both positively and negatively) by the Project. It is defined by the Travel to Work Areas (TTWAs) for Bangor, Caernarfon and Llangefni TTWA and the Holyhead TTWA. The spatial boundary is defined based on a best fit selection of 2011 Census of Population administrative wards. This area is further disaggregated as defined below.	This area is a key focus of the topics considered within the socio-economic assessment. Accommodation, tourism, public services, social cohesion and quality of life will all be considered mainly within this area. As far as is possible, supply chain and business impacts will

Area		Geographic Scope	Assessment Scope
			also be considered at this scale.
Isle of Anglesey	Anglesey North	An area conforming to a sub division of the Isle of Anglesey, representing communities around Amlwch and most closely located to the Power Station Site. This sub division is based on aggregates of 2011 wards. This sub division will be used to assess impacts at a micro level.	
	Anglesey West	An area conforming to a sub division of the Isle of Anglesey, representing communities on the west side of the Isle of Anglesey including Holyhead. This sub division is based on aggregates of 2011 wards. This sub division will be used to assess impacts at a micro level.	
	Anglesey South	An area conforming to a sub division of the Isle of Anglesey, representing communities on the south side of the Isle of Anglesey including Llangefni and the Menai Crossing. This sub division is based on aggregates of 2011 wards. This sub division will be used to assess impacts at a micro level.	
Mainland	Menai Mainland	Menai Mainland is a sub division of Gwynedd, representing the communities on the mainland located within the key socio-economic study area including the main settlements of Bangor and Caernarfon. This sub division will be used to assess impacts at a micro level.	
Daily Construction Commuting Zone (DCCZ)		This area is based upon a 90 minute drive time distance from the Power Station Site defined using OS Open data Strategic Shape data. The definition is based on a best fit selection of 2011 Census of Population administrative wards. Any ward penetrated wholly or partially by a 90 minute isochrone has been included in the definition. The area represents the one way travel time limit assumed for workers to commute on a daily basis from their permanent residence (these individuals are	It is from this zone that commuting or home based workers are drawn. The assessment of employment and skills impacts will therefore focus on this geographic area. Supply chain and business impacts and knock on economic impacts will also be

Area	Geographic Scope	Assessment Scope
	referred to as home based workers). It is from this zone that home-based employment is identified.	considered at this scale.
North West Wales	This area consists of local authority districts of the Isle of Anglesey; Conwy and Gwynedd. This is consistent with the area definition used in the North West Wales Labour Market Study 2010.	This area will be used in situations where it is not possible to represent the KSA due to statistical limitations.
North Wales	This area consists of a grouping of local authority districts consisting of the Isle of Anglesey; Gwynedd; Conwy; Denbighshire; Flintshire and Wrexham. This area will be used when it is not possible to represent the DCCZ due to statistical data limitations. It is worth noting that this area is more urbanised and industrial (with key developments in certain areas of Flintshire etc) and has a much larger population than the DCCZ.	This area will be used when it is not possible to represent the DCCZ due to statistical data limitations.
National / Other	Standard geographies such as Wales; Great Britain and the UK are also used where appropriate either to provide context or to consider impacts which might arise outside of the above geographies.	Economic impacts associated with project investment (both construction and operation) will be considered at the UK level.

These locations are all shown in figure 18.1. Figure 18.2 shows the key socio-economic study area (KSA) in more detail.

Environmental Impact Assessment Scoping Report	DCRM Reference No	Revision:	1.1
	WN03.03.01-S5-PAC-REP-00004	Issue date:	15/03/2016

Figure 18.1: Socio-economic study areas

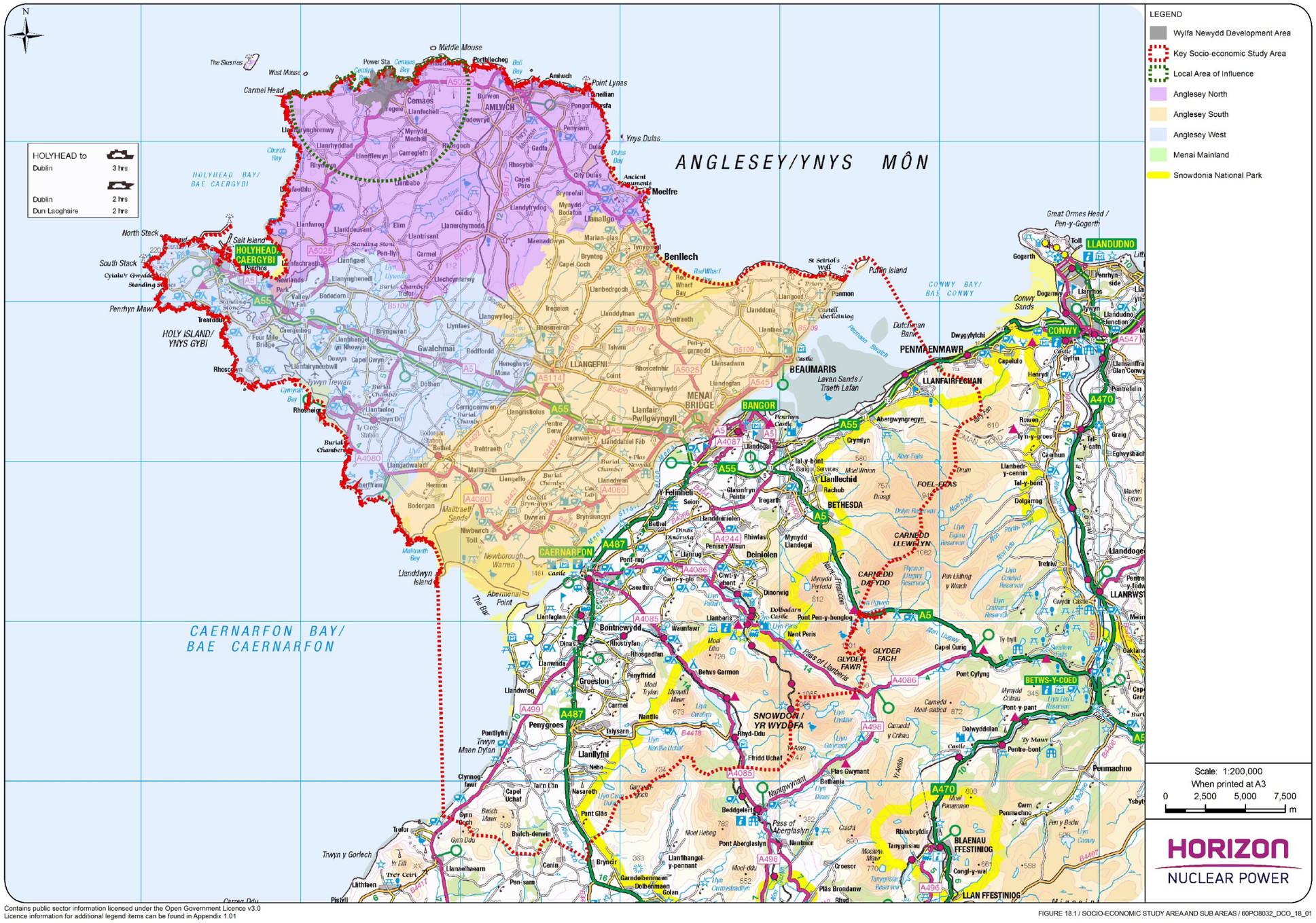

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FIGURE 18.1 / SOCIO-ECONOMIC STUDY AREA AND SUB AREAS / 60PO8032_DCO_18_01

Environmental Impact Assessment Scoping Report	DCRM Reference No	Revision:	1.1
	WN03.03.01-S5-PAC-REP-00004	Issue date:	15/03/2016

Figure18.2: Key Socio-economic study area

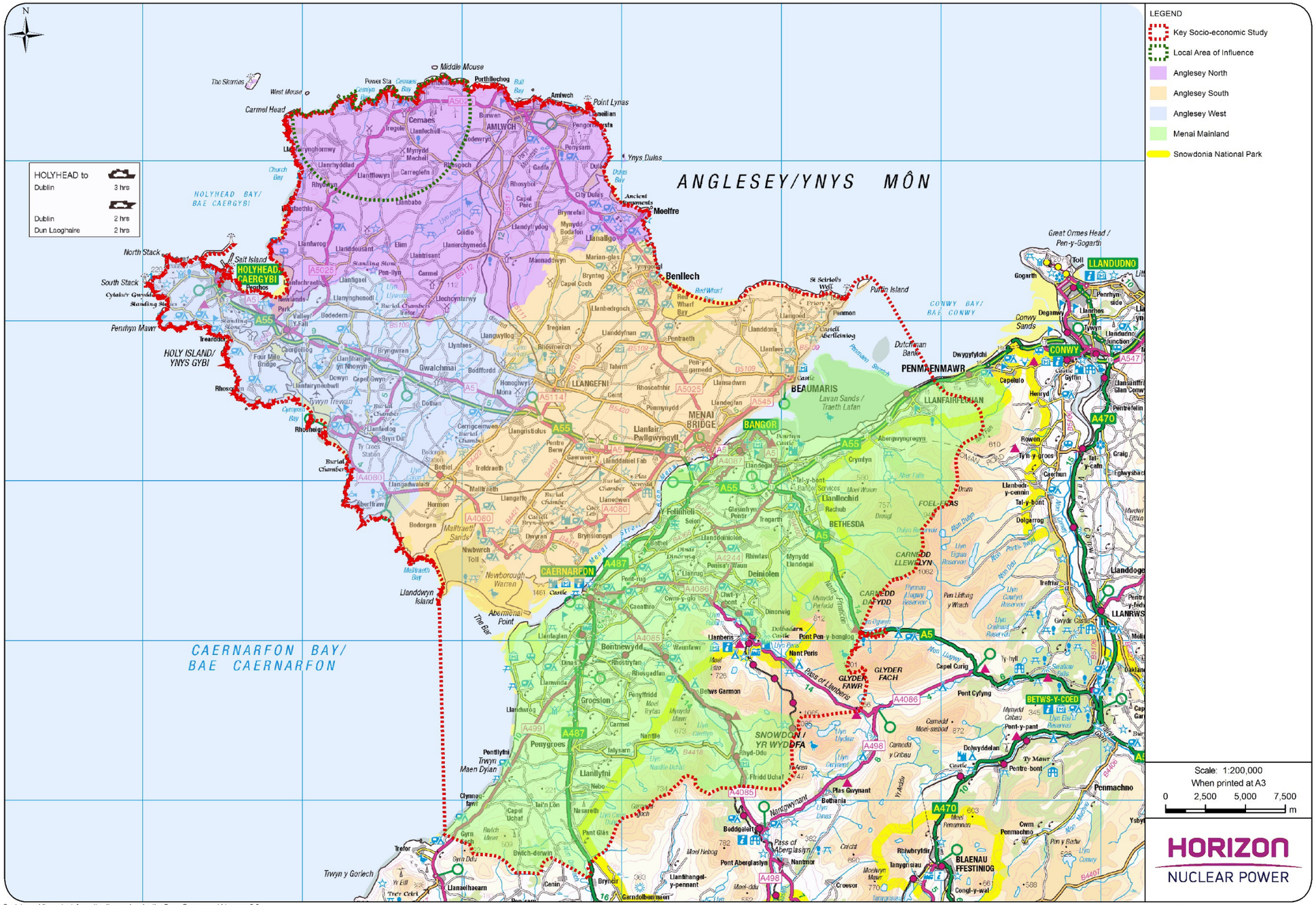

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FIGURE 18.2 / KEY SOCIO-ECONOMIC STUDY AREA / 60PO8032_DCO_18_02

18.4.2 Assessment methodology

Socio-economic assessment is an iterative process informed through data collection and analysis, and consequently initial preliminary assumptions/understanding may need to be modified in the light of new information. This may be described as a process of continuous improvement. There is therefore a need to adopt a flexible approach whereby information is validated and updated through an ongoing process of consultation with Project proponents and other stakeholders, especially potentially affected communities.

The methodology steps that have been undertaken are summarised as follows:

- Describe the existing socio-economic baseline conditions, including the type and scale of receptors and the sensitivity of receptors in terms of scarcity or overabundance and how they feature in planning/policy priorities. Unless stated otherwise, the baseline data have been gathered from the 2011 Census. Please note, analysis of the DCCZ zone has been based on the nearest approximation of relevant 2011 Census wards falling within the DCCZ boundary.Identify and assess potential changes to the existing baseline conditions using defined assessment criteria, informed by professional judgement, consultation with key stakeholders and baseline surveys.
- Identify measures to avoid, manage, mitigate potential adverse effects and enhance potential beneficial effects.
- Assess residual effects arising from the Wylfa Newydd Project.

18.4.3 Assessment Criteria

An effect will generally derive from a physical change caused by the project (including changes in air quality, noise or views), however for socio-economic assessment these changes can also be perceptual (e.g. changes in wellbeing indicators) and related to wider economic change (e.g. property prices or investment into the economy). The consequence of the impacts on the receptor will be termed an “effect”. Effects generally take the form of:

- Increase or decrease;
- Displacement;
- Change in amenity/quality of life; and/or
- Severance/access.

The significance of an effect is commonly determined by assessing the magnitude of the impact (physical change) and the sensitivity of the receptor (the beneficiary, user, occupier or owner). In the case of the socio-economic assessment both magnitude and sensitivity are implicitly considered in the identification of significant criteria. Rather significance is identified through benchmarking effects within the evidence base available and considering the change in light of the sensitivity of the receptors in question.

The scope, approach, and magnitude criteria developed to assess the effects on each of the socio-economic topic areas will be presented in the environmental statement for the topic areas identified above.

The geographical scope of the assessment will vary between topics, as effects may be realised differently.

19 Public Access and Recreation

19.1 Introduction

This chapter describes the current environmental baseline for public access and recreation and potential effects associated with the proposed activities within the Wylfa Newydd Development Area (Proposed Activities).

Recreation relates to both on-shore and marine recreational activities. Initial conclusions are based on desk based research, survey work and consultation with key stakeholders.

As described in chapter 2, National Policy Statements EN-1 and EN-6 provide overarching guidance regarding the development of NSIPs relating to energy and nuclear power generation.

NPS EN- 6 acknowledges that with regard to human health and well-being there is the potential for new nuclear developments to impact on land that has recreational and amenity value. Generic health impacts from energy NSIPs are covered by NPS EN-1.

NPS EN-1 states that the assessment of impacts relating to an NSIP should include an assessment of the *"…effects of the proposed project on maintaining coastal recreation sites and features*". It refers to the UK Government's policy to ensure that there is adequate provision of high quality open space (including green infrastructure) and sports and recreation facilities to meet the needs of local communities. Key to this topic area is reference to applicants taking advantage of opportunities to maintain and enhance access to the coast. NPS EN-1 also identifies the importance of rights of way, National Trails and other rights of access to land as important recreational facilities.

This topic covers a number of distinct elements, these are:

- Public access – the effects of the Proposed Activities on PRoW (footpaths, bridleways, cycle routes and byways) and other footpaths, including permissive footpaths;
- Onshore recreation – includes the effects of the Proposed Activities on formal facilities (for example sports playing fields) as well as on more informal recreational activities such as horse-riding, angling, bird watching, accessing beaches, access National Trust land and dog walking; and
- Offshore recreation – covers likely effects of the Proposed Activities on both formal and informal water based recreation (including for example, canoeing, sailing, boat trips.

19.2 Existing Environment

The local study area is served by a network of public footpaths, including a section of the Wales Coast Path. The footpath network provides access to a range of coastal and inland environments, with long distance views to the west towards Cemlyn Bay and east towards Llanbadrig Point. Wylfa Head provides a good vantage point with views over the landscape and seascape and is widely used by the public.

National Cycle Route 566 (the Copper Trail) is currently routed along the minor road from Cemlyn through a section of the Wylfa Newydd Development Area. This route is a recreational resource to both local people and tourists and is widely advertised with leaflets describing the route, published by Sustrans.

The part of Cestyll Garden (Grade II listed in the Register of Parks and Gardens of Special Historic Interest in Wales) that is currently open to the public two days a year, lies just to the west of the Wylfa Newydd Development Area. There is National Trust land to the east and west of the Wylfa Newydd Development Area which provides access to the coastline and includes a permissive section of the Wales Coast Path between Cemlyn Bay and Cestyll Gardens. Further afield, to the west of Cemlyn Bay and at Llanbadrig Point, are two additional areas of National Trust land.There is access to the foreshore from the public footpaths, for example at Port-y-pistyll and Port yr Ogof. Members of the public have been observed swimming at Port yr Ogof.

The Isle of Anglesey has been designated as a European Geopark (the GeoMôn Geopark) as a result of its outstanding geodiversity and geological heritage. Furthermore, in November 2015, the GeoMôn Geopark was designated as a UNESCO Geopark by virtue of its inclusion in the Global Geopark Network at UNESCO's 38th General Conference. This international status means that public access to these geological features is important.

Anglesey offers a wide range of sailing activities. Both Cemlyn and Cemaes Bays offer slipways from which boats can be launched. Recreational boat trips to undertake activities such as bird and wildlife watching, wreck diving and coastal pleasure trips, operate out of Cemaes Bay and, further to the east, from Amlwch harbour.

The cafe at the Existing Power Station Visitor Centre is used by locals and visitors', including Wales Coast Path users (as it is on the existing alignment of this footpath) and road cyclists travelling on the Copper Trail or the A5025, and the Existing Power Station Visitor Centre is also used as a wider education resource. At the time of writing, it comprises a café, exhibitions of electricity generation and classrooms, and is due for closure in December 2015. It is therefore not considered to be part of the baseline since it would become unavailable to recreation whether or not the Wylfa Newydd Project proceeded.

The Wylfa Sports and Social Club is a private members club situated on the Existing Power Station approach road, opposite the existing Visitor Centre. This club is owned by the Nuclear Decommissioning Authority.[36] The club incorporates an event hall and lounge bar, pool and snooker room, shooting facility (used by a clay pigeon shooting club), multi-function outdoor games court and football pitch. The membership of the club includes the general public from the surrounding local community. The sports pitches and hall of the club house are rented out for functions and used for local sports fixtures. This facility is currently funded by Magnox but this will cease in 2018 when the current lease expires. The future of this facility is therefore uncertain in the evolving baseline situation whether or not the Wylfa Newydd Project proceeds.

Within the regional study area, recreational facilities considered to be of relevance comprise leisure centres, swimming pools, cinemas, theatres, gyms and golf courses. There are five public leisure centres in Anglesey and a further six in northern Gwynedd, offering a variety of sports including swimming pools, tennis courts and other indoor and outdoor activities.

[36] The non-departmental public body created through the Energy Act 2004 responsible for decommissioning and cleaning up civil nuclear facilities on 17 sites and providing for the disposal of all the resulting wastes.

19.3 Potential Effects and Mitigation

The process of scoping identified potential for effects to occur as a consequence of construction and operation of the Wylfa Newydd Project.

The potential effects associated with the Proposed Activities during Construction are:

- Disturbance to recreational users, potential requirement for footpath diversions
- Permanent closure of existing PRoWs
- Reduction in amenity of surrounding PRoW network due to visual effects, dust and noise.
- Disturbance to recreational assets such as Wylfa Head and restrictions to access for recreational activity such as walking, swimming and angling along the foreshore.
- Closure of Cemlyn Bay Road and the access road to fisherman's car park.
- Restriction of water-based recreational activity along the Porth-y-pistyll foreshore, for example, kayaking or swimming and permanent restriction of access to Porth-y-pistyll during construction for other users who may access the foreshore such as anglers or those wanting to walk along the shore.
- Recreational facilities operating over-capacity due to the influx of construction workers.

Potential operational effects comprise:

- New industrial feature in landscape potentially reducing the desirability of the PRoW network.
- Introduction of new land contours through the creation of stockpiles in the form of 'drumlins', thus potentially reducing accessibility of the PROW network.
- Permanent loss of PRoWs.
- Permanent restrictions of water-based recreational activity along foreshore and Porth-y-pistyll.

Mitigation is currently being developed including diverting of PRoW, construction of Horizon Visitor Centre and installation of interpretation boards around the site. Horizon will continue to consult with the IACC and NRW on its plans regarding the routing of new PRoW. In addition, Horizon intends to consider the potential opportunities for enhancement within the Wylfa Newydd Development Area

19.4 Proposed Scope, Methodology and Criteria

19.4.1 Study Area

In the PEI Report published as part of the Stage One pre-application consultation, the public access and recreation study area was identified as approximately 2.5km from the centre of the Wylfa Newydd Development Area. Following further consideration of the potential effects, this has been modified and extended so that the Wylfa Newydd Development Area study area now extends 2km from the boundary of the Wylfa Newydd Development Area (figure 19.1). The reason for this change is that the potential effects are associated with the Proposed Activities as a whole rather than based on a single point location. The area includes the villages of Cemaes and Llanfechell as the nearest communities to the Wylfa Newydd Generating Station.

The revised study area is considered to adequately capture the PRoW network that may be affected by activities within the Wylfa Newydd Development Area as well as access to the local foreshore, taking into account key access points for the PRoW network, car parks and logical start / end points for recreational visits.

The offshore area includes the area where effects are likely to occur for recreational users such as canoeing and boating. Such effects would primarily relate to the changing visual landscape as the construction work progresses.

This local study area is considered to adequately capture usage of the PRoW network in the vicinity of the Wylfa Newydd Development Area and access to the local foreshore, taking into account features such as key access points to the network, Tregele, Cemaes and Llanfechell as the nearest communities to the Power Station; car parks and logical start/finish points for recreational journeys.

Figure 19.1: Public access and recreation study area

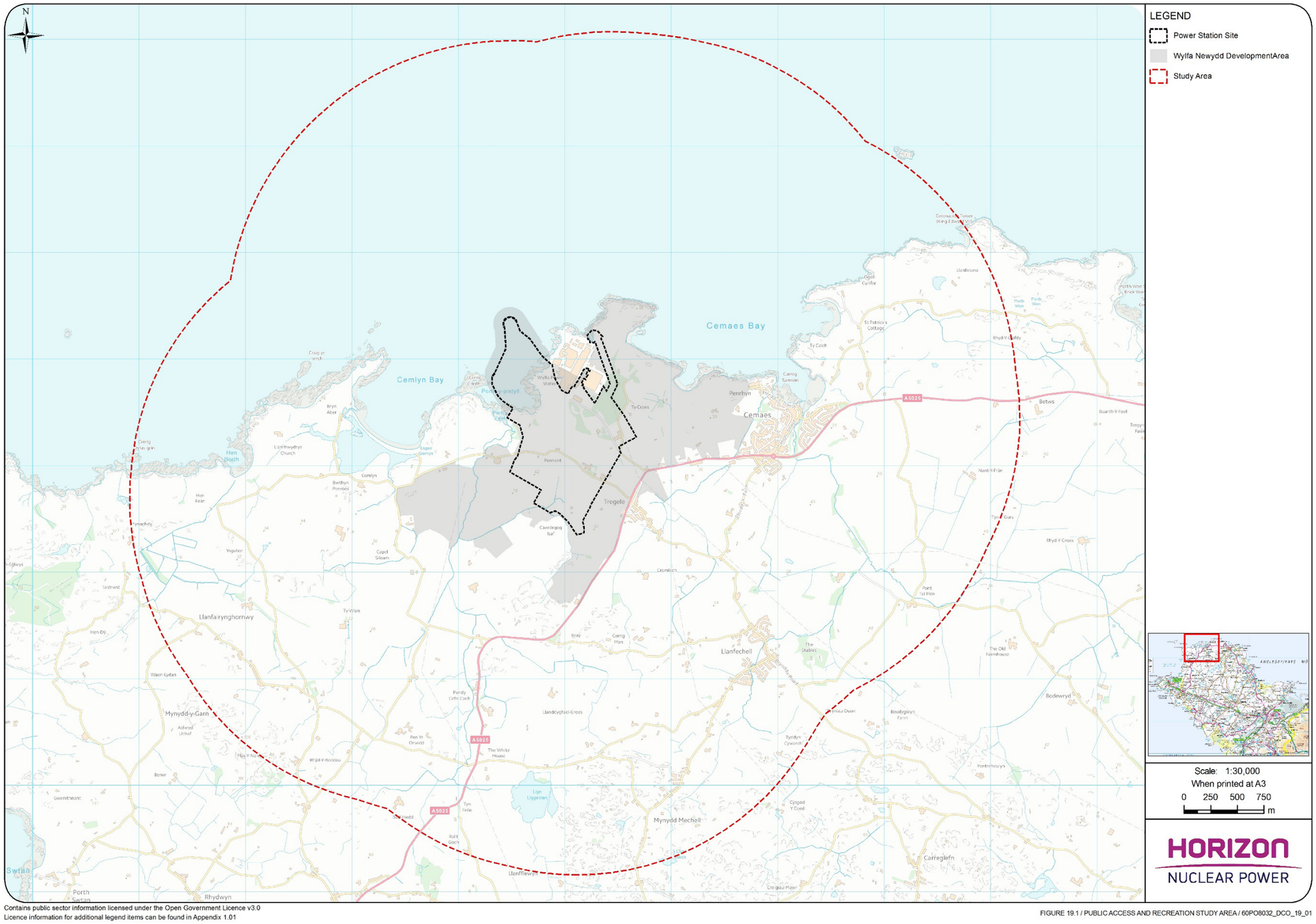

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FIGURE 19.1 / PUBLIC ACCESS AND RECREATION STUDY AREA / 60PO8032_DCO_19_01

19.4.2 Assessment Methodology

Baseline information regarding the study area has included desktop assessment. The assessment has included a review of relevant policies and plans, review of OS mapping and the PRoW definitive map and searches of local tourism websites. This baseline information has then been supplemented by site visits to the local study area and by undertaking user counts and user questionnaires. Consultation with key stakeholders and statutory consultees has been undertaken to assist in the interpretation of the baseline information.

In identifying the potential effects of the Wylfa Newydd Project on public access and recreation, the key receptors set out in table 19.1 have been identified.

Table 19.1: Key Receptors for Public Access and Recreation

Topic	Receptor
Public Access	• Users of Wales Coast Path • Users of Public Rights of Way • Users of permissive paths and other routes • Users of National Cycle Network • Users of car parks for recreation access
Onshore Recreation	Visitors to the following: • Wylfa Head • National Trust coastline • Cestyll Gardens • Geo-Môn Geopark • local beaches and coves • Wylfa Information Centre • Wylfa Sports and Social Club Users of Picnic Areas and benches
Offshore Recreation	Local users undertaking the following activities: • Sailing • Boating • Sea-fishing • Wildlife watching • Diving • Swimming

The values of the above identified receptors will be assessed, based on a range of factors that includes usage, designations and attractiveness. These factors have been informed by the baseline studies.

The value criteria have been adapted from general criteria, using professional judgement. The higher values have been attributed to those recreational receptors which offer opportunities that are matched by few alternatives (i.e. have limited potential for substitution) and/or for which any effect on the receptor would affect a higher number of recreational users. The magnitude criteria relate to the scale of change predicted to occur as a result of the Proposed Activities. The significance of effects on public access and recreation has been assessed based on consideration of the value of the receptor affected by the Proposed Activities and the magnitude of change predicted. The assessment of significance has been made through professional judgement based on a matrix approach.

Having identified and assessed the effects of the Wylfa Newydd Project, the potential for mitigation will be considered. In certain circumstances it may be possible to mitigate the effect to such a level that there is no residual effect, whereas in other situations it may be that even with mitigation there is a significant residual effect.

In addition to mitigation, Horizon will also identify locations where enhancement opportunities may exist. These are opportunities that do not seek to mitigate a predicted effect, but rather provide an overall benefit from the Wylfa Newydd Project in respect to public access and recreation.

20 Traffic and Transport

20.1 Introduction

This chapter reviews the traffic and transport elements associated with the EIA of the Wylfa Newydd Project, including road, rail, air, shipping/ MOLF, cycling and walking. It describes the current environmental baseline for traffic and transport and the potential effects associated with proposed activities during Construction, Operation and Decommissioning. Off-Site Power Station Facilities are also described and evaluated where appropriate.

This chapter includes consideration of all means of moving materials or people, and the existing conditions on the transportation networks. Additional traffic or transport movements will be generated during the construction, operational and decommissioning phases and has the potential to cause disruption.

20.2 Existing Environment

20.2.1 Walking and Cycling

The Power Station Site is located in a position relatively remote from significant population centres with only limited infrastructure to enable journeys to be safely made by foot. Walking is a likely mode of travel for commuting journeys up to one mile (1.6km), which encompasses the settlements of Cemaes and Tregele. Cycling is considered an appropriate mode for commuting journeys of up to five miles (8km), which encompasses Cemaes and Amlwch to the east and Llanfechell to the south east.

On the A5025 there are continuous footways between Tregele to the south and Cemaes to the north. There are no segregated on-road cycle routes in the vicinity of the site. However, there is an extensive network of rural roads that links to local population centres and is currently only lightly trafficked.

As set out in chapter 19, National Route 566 of the National Cycle Network, locally known as ‘Lon Las Copr’ or the ‘Copper Trail’, provides a predominantly on-road route around the northern coast of Anglesey. The route passes along Cemlyn Road to the south of the Existing Power Station, falling within the Power Station Site. This route will therefore require diversion as part of the Project.

20.2.2 Air

Anglesey Airport (RAF Valley) currently offers domestic flights to Cardiff (year round), from where direct connecting flights to Western Europe and Mediterranean destinations are available.

Anglesey Airport is located at Llanfair Yn Neubbwll, approximately 22km south of the Power Station Site. The airport connects to the A55 at junction 3 to the west and junction 4 to the east via a number of rural roads. The A55 junctions are approximately 2.5 km to the north of the airport boundary.

For other domestic and international flights, the nearest airports are located at Liverpool John Lennon Airport, Manchester Airport and Birmingham Airport. The A55 and the wider strategic

road network allow connections between the Existing Power Station and Liverpool John Lennon Airport (2 hours), Manchester Airport (2 hours), Birmingham Airport (3 hours) and Heathrow Airport (4.5 hours).

These airports also have rail connections to Holyhead from Liverpool South Parkway station (3 hours, three trains required), Manchester Airport station (3 hours, two trains required), Birmingham International station (3.5 hours, three trains required) and Heathrow Airport (5 hours, three trains required).

20.2.3 Sea

Holyhead Port is located some 25km south of the Existing Power Station. The port is operated by Stena Line Ports Ltd and provides passenger services to Dublin and forms the principal surface transport link to Ireland from north Wales and the north-west of England. Historically Holyhead also provided passenger services to Dun Laoghaire just to the south of Dublin; however these services ceased in 2015. Vehicle access to and from the port is via the A55, which runs to the south of the main port area.

The draft *North Wales Joint Local Transport Plan* details the highway improvement works that are proposed to provide better links between the port, the A55 and Holyhead town centre. These include the provision of new dual carriageway link roads.

Smaller port facilities are provided at Cemaes and Amlwch. These are primarily used for recreational sailing craft and are only suitable to accommodate small craft and vessels. Vehicular accesses to these ports are also not suitable for accommodating significant numbers of construction vehicles.

20.2.4 Rail

Anglesey benefits from a principal railway route that extends from England along the north Wales coast, across the Britannia Bridge, and on to Holyhead. The key interchanges for rail travel are at Holyhead and Valley on Anglesey and Bangor on the mainland, all of which are on the north Wales coast line.

Holyhead railway station is some 25km south of the Existing Power Station and immediately south of Holyhead Port. It is served by hourly services along the north Wales coast line, connecting directly to Chester and Crewe to the east and continues to Birmingham and Cardiff. In addition, five services per weekday are provided by Virgin trains to London Euston.

The closest railway station to the Existing Power Station is located at Valley, but this station is currently only a request stop, with reduced-length platforms and is only served by around half of the services that operate between Bangor and Holyhead.

Bangor railway station is some 35km south east of the Existing Power Station, on the mainland opposite Menai Bridge, and is also located on the north Wales coast line. It provides the same level of service as Holyhead railway station for regional services, giving hourly weekday direct services to Holyhead, Wrexham and Shrewsbury, with opportunities for connections to other direct services. Six services per weekday are provided by Virgin trains to London Euston i.e. one additional service per day compared to Holyhead.

The Draft North Wales Joint Local Transport Plan 2015 - 2020 and the Network Rail report Delivering a better railway for a better Wales: our plans for 2014 - 2019 include the following relevant proposals:

- Abergele Park and Ride at Abergele railway station (noted to potentially serve the “Wylfa nuclear new build”) which is 80km to the east of Holyhead;
- modernisation of the north Wales coast line (Phase one) - this scheme includes new signalling and track infrastructure between Flint and Llandudno to improve line speeds; and
- modernisation of the north Wales coast line (Phase two) - this scheme includes new signalling and track infrastructure between Llandudno and Holyhead to improve line speeds.

Electrification of the north Wales coast line is currently being considered as a future possibility, though no feasibility studies have been undertaken to establish the potential requirements, costs or timescales.

20.2.5 Bus

Bus services across Anglesey are commensurate with rural levels of service, with infrequent services which are heavily subsidised by the IACC. A network of routes provides access to both local and Anglesey-wide facilities and services, as illustrated as detailed in figure 20.1.

Figure 20.1: Bus network map for the Isle of Anglesey (IACC, 2011)

The closest bus stops to the Existing Power Station are around 1km to the south in Tregele, with further stops provided some 2km to the north in Cemaes. There are currently a limited number of bus services from these stops, with a two-hourly service to Holyhead and Amlwch (Monday to Saturday) and a circular service that includes Amlwch and Cemaes three times a day (Monday to Saturday). There is also an additional service from Cemaes to Bangor four times a day (Monday to Saturday).

The bus journey times between Amlwch and Tregele are approximately 10 to 15 minutes, from Holyhead to Tregele is approximately 35 minutes, and Bangor to Cemaes is approximately one hour and 10 minutes.

A comprehensive network of school services is also provided. A voluntary community bus service (Car Linc Môn) operates within the study area, based at Medrwn Môn, Llangefni. This provides transport for people who are otherwise unable to make essential journeys to community facilities, and typically provides a service for the elderly and disabled.

A further service (Môn Community Transport) provides minibus transport for people with disabilities on Anglesey, and is primarily aimed at wheelchair users and those with impaired mobility.

20.2.6 Existing Highway Network

The existing highway network comprises the following main routes, as depicted in figure 20.2.

Figure 20.2: Traffic and transport study area

The A55 trunk road (the North Wales Expressway) forms the strategic route onto Anglesey. Comprising a high quality dual carriageway with two-level grade-separated junctions, the A55 connects Holyhead in the west to mainland Wales in the east, via the Britannia Bridge, before continuing eastwards across North Wales towards Chester. The route connects with the A5 at various points, including Valley.

The A5 comprises a single carriageway road connecting Holyhead with the Menai Bridge, before continuing into mainland Wales. The A5 heads south-east from Holyhead to Valley, where it intersects with the A5025 at a signalised junction, before heading east towards Caergeiliog and the centre of the island. The route has varying speed limits and, with regard to highway geometric design principles, is generally of a good standard; however, some sub-standard features relating to width and horizontal radii (radius (tightness) of a curve) are evident.

The A5025 between Tregele and Valley is a single carriageway road of various speed limits, predominantly the National Speed Limit (60mph), but reducing to between 30mph and 50mph within villages. It is of a good standard and of acceptable width, although some issues have been recorded relating to horizontal radii (bends), vertical radii (humps or dips) and narrowing widths. The A5025 is also the rote for the Abnormal Load vehicles to/from the existing power station.

20.2.6.1 Key Junctions

There are a number of junctions on the A5025 and A55 that have been considered as part of the Environmental Baseline, these are shown in Table 20.1 and indicated on location plan in figure 20.3.

Figure 20.3: Locations of key junctions considered within Baseline operational assessments

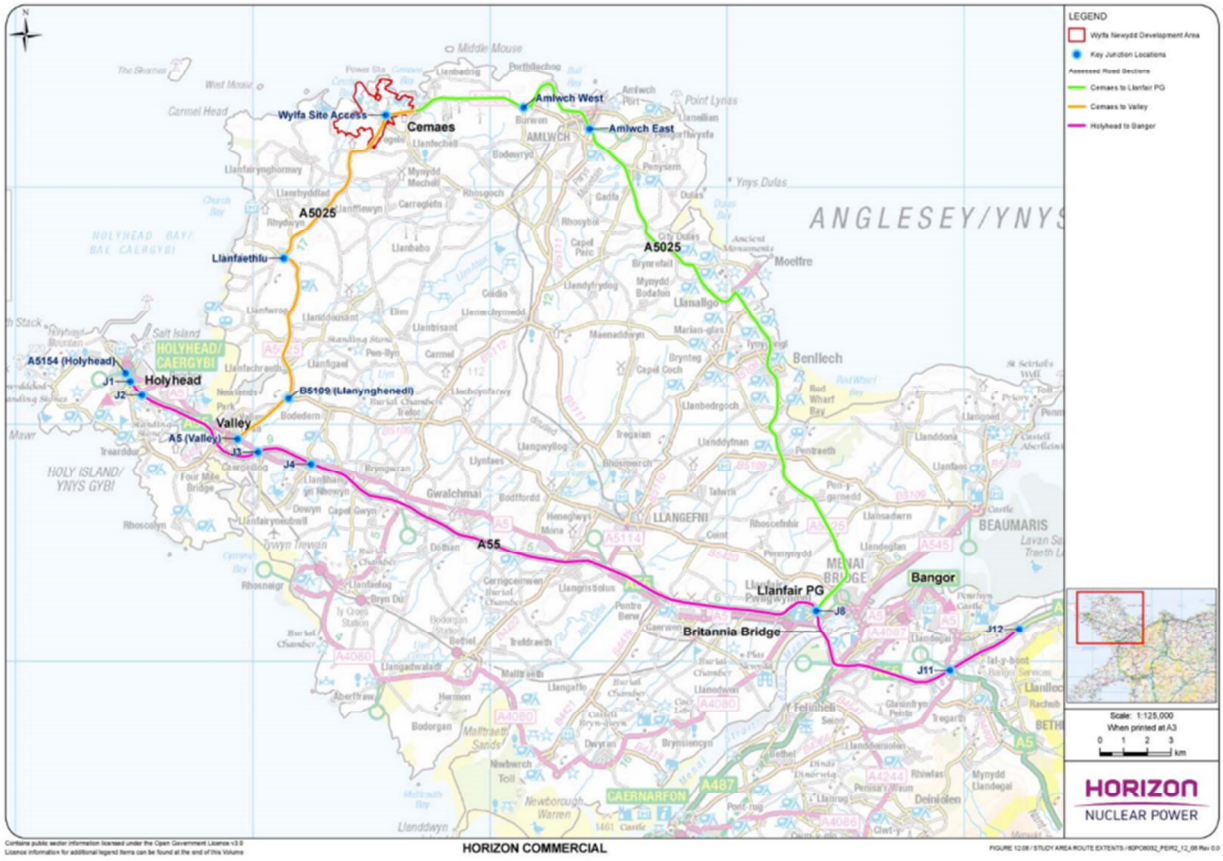


Table 20.1: Key junctions on the A5025 and A55

Junction	Road	Location	Junction Type
Key Junctions	A5025	A5 (Valley Junction)	Signalised crossroads
		B5109 (Llanynghenedl)	Major / minor
		Amlwch west	Major / minor
		Wylfa site access	Major / minor
		Llanfaethlu	Major / minor
		Amlwch east	At-grade roundabout
	A55	Junction 2 (Holyhead east)	Dumbbell roundabout
		Junction 3 (Valley)	Dumbbell roundabout
		Junction 4 (Dalar Hir)	Dumbbell roundabout

Other Junctions	A55	A5154 (Holyhead)	Signalised major / minor
		Junction 1 (Holyhead)	At-grade roundabout
		Junction 8 (A5025, Llanfairpwllgwyngyll)	Grade-separated diamond
		Junction 11 (Bangor Services)	Grade-separated roundabout
		Junction 12 (Tal-y-bont)	Grade-separated diamond

20.2.6.2 Other Local Roads

The B5109 to the north of the A5 links with the A5025 to the east at Pentraeth and the west at Llanynghenedl, and passes through various settlements including Llangefni, Llynfaes and Bodedern. The B5111 links Llangefni in the south with Amlwch in the north, and provides an alternative route to the Wylfa Newydd Development Area from the A55. It passes through a number of settlements including Llannerch-y-medd, Llangwyllog and Rhosybol.

The National Speed Limit (60mph) generally applies on both the B5109 and B5111 single carriageways, reducing to 30mph within settlements.

An unclassified road provides a link from the B5111 to Rhosgoch and on to Llanfechell, before joining the A5025 at Cemaes. This route is characteristically rural and narrow in places with substandard horizontal and vertical radii and visibility issues, but for the majority of its length two vehicles can pass.

A further unclassified road links Llannerch-y-medd with Brynteg and connects the Power Station Site to eastern areas of Anglesey as an alternative to the A5025. This rural road has sufficient width for two vehicles to pass along its length, and is considered to form a possible alternative route for some cars. The route could provide linkage to the Wylfa Newydd Development Area via the Rhosgoch-Llanfechell road or via the B5111.

20.2.7 Traffic Data and Surveys

In order to establish the current traffic levels within the study area, an extensive programme of data collection was undertaken in 2014 to establish the current traffic levels within the study area. The following traffic flow data were collected and used to inform the traffic model and to establish current traffic levels:

- Manual Classified Turning Counts were undertaken by surveyors at 35 locations within the study area on the A5025 and A55 over a 14 hour period (06:00 to 20:00) in 2014:
  - Thursday 28 August 2014;
  - Saturday 30 August 2014;
  - Thursday 27 November 2014; and
  - Saturday 29 November 2014;

- Automatic Traffic Count 24 hour data were collected at 26 locations within the study area over one month periods in August and November 2014.

Additional data from permanent Automatic Traffic Count counters on the A55 and A5025 will also be used to inform the model.

The results of the surveys show that typical daily flows (known as Annual Average Daily Traffic (AADT) flows) on the A5025 are approximately 5,000 near Valley and just under 3,000 near the site.

Data indicates that the November 2012 traffic flows are lower than August flows, highlighting seasonal variation in flows along the majority of the strategic routes in Anglesey.

20.2.8 Accidents

From data supplied by IACC, the numbers of personal injury accidents[37] recorded on the A5025 and A55 over the latest available complete 5 year period (January 2010 to December 2014) are shown in table 20.2 below.

Table 20.2 Summary of accident data for A55 and A5025

Route	Personal Injury Accidents (2010 to 2014)				Comments
	Fatal	Serious	Slight	Total	
A5025 (site to Amlwch)	0	9	9	18	1 accident (Serious) involved a pedestrian 2 accidents (one Slight, one Serious) involved cyclists 6 Accidents (2 Slight, 4 Serious) involved motorcyclists 4 accidents (2 Slight, 2 Serious) involved HGVs or buses
A5025 (Valley to site)	0	3	16	19	1 accident (Slight) involved a pedestrian 2 accidents (one Slight, one Serious) involved cyclists 3 Accidents (one Slight, two Serious) involved motorcyclists 3 accidents (all Slight) involved HGVs or buses
A55 (juncs 2 to 11)	1	11	44	56	1 accident (Slight) involved a pedestrian 4 accidents (one Slight, two Serious, one Fatal) involved cyclists 3 accidents (two Slight, one Serious) involved motorcyclists 6 accidents (four Slight, two Serious) involved HGVs or buses

[37] A road accident that has resulted in someone sustaining an injury.

Available data indicates that on the A5025 from Valley to the Wylfa Newydd Development Area, the observed accident rates across the above five year period are slightly lower than the national average.

There were no major injury accident clusters of three or more injury accidents within the topic study area. Based on recorded evidence, it is not considered that there is an undue road safety problem on any of the approach routes to the Wylfa Newydd Development Area.

20.2.9 Receptors and Severance

A number of sensitive receptors have been identified along the main routes to the Wylfa Newydd Development Area as well as other potential alternative routes from the A55 to the A5025. These include a primary school, secondary school and built up areas.

Built up areas with schools are located in close proximity to the A5025 in Llanfachraeth and Llanrhyddlad. There are no formal pedestrian crossing facilities in either village.

The Wylfa Newydd Project has the potential to affect the following key receptors:

- drivers/passengers using the existing transport network;
- Non-motorised users (i.e. pedestrians, cyclists, equestrians) using/crossing the road network;
- Effects on drivers due to changes in speed on the road network;
- public transport users; and
- communities living in close proximity to the road network where changes are forecast/predicted.

Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery, and generally only occurs on highly trafficked roads. Given that average daily flows on the A5025 are less than the DMRB threshold guideline for severance (8000 vehicles)[38] coupled with the relatively low level of recorded pedestrian movement within villages, the existing level of severance is not considered a significant issue.

20.2.10 Driver Stress

A review of the 2014 surveyed traffic flows suggests that drivers currently using the A5025 do not experience lengthy delays or queuing at junctions. Notwithstanding this, sections of the A5025 through the villages and on their approaches currently have speed restrictions in place, with sections between settlements being derestricted. Some parts of the A5025 offer long, straight sections of derestricted carriageway, connected by bends that do not meet current standards for new roads. Such changes in speed and vehicular flow are considered to be a source of some frustration to drivers, affecting their ability to drive at a speed consistent with their expectations and the standard of the road.

On the A55, driver stress is principally focused on users crossing the Britannia Bridge. Delays and queuing are present during peak periods as a result of congestion caused by the junction

[38] DMRB Volume 11 Environmental Assessment Section 3 Part 8 Pedestrians, Cyclists, Equestrians and Community Effects

merges either side of the bridge. Elsewhere, the A55 is a high quality dual carriageway with grade-separated junctions.

20.3 Potential Effects and Mitigation

Although a large proportion of heavy deliveries, and in particular most AILs, would be delivered to the Power Station Site by sea, the construction and Full Operation of the PowerStation is likely to generate additional movements of light goods vehicles, buses and HGVs along the A55 and along the A5025 between Valley and the Power Station Site at different stages of the Wylfa Newydd Development. These trips will principally be associated with construction and staff workers. It was also identified that the construction of the Associated Development will necessitate a number of additional vehicles on the road network.

Full Operation traffic associated with the Power Station is expected to be broadly similar to that associated with operation of the Existing Power Station, which is to be decommissioned, in terms of numbers of HGVs, but there is likely to be an increase in worker numbers. Key potential issues that are likely to have an effect on the above identified receptors include:

Construction stage

- Increase in HGV and bus movements on the local road network;
- Increase in overall traffic flows;
- Potential effects on existing centres of activity (e.g. residential areas such as Cemaes and Tregele and schools) associated with severance, pedestrian delay and amenity, fear and intimidation;
- Potential effects on driver stress associated with changes in traffic speeds, flows, congestion, road layout and geometry, visibility, junction layout and frequency, road surface characteristics or carriageway widths;
- Potential effects on existing drivers, passengers and public transport users associated with changes in vehicle journey times and overall amenity experienced;
- Potential effects associated with increased marine vessel movements; and
- Increased risk of accidents.

Operation stage

- Increase in HGV and bus movements;
- Increase in overall traffic flows;
- Potential effects on existing centres of activity (e.g. residential areas, schools), associated with severance, pedestrian delay and amenity, fear and intimidation;
- Potential effects on driver stress associated with changes in traffic speeds, flows, congestion, road layout and geometry, visibility, junction layout and frequency, road surface characteristics or carriageway widths;
- Potential effects on existing drivers associated with vehicle journey times; and
- Increased risk of accidents

Horizon has developed and incorporated the following strategic measures into the Project to reduce the level of impact on the existing transport network associated with the movement of construction workers and material:

- MOLF;
- Logistics Centre;
- Temporary Workers' Accommodation and dedicated bus services;
- Park and Ride Facilities and associated bus services;
- It is likely a dedicated bus services for the transportation of workers living in the north and east of Anglesey; and
- A5025 Highway Improvements.

To mitigate the residual impacts still further, as part of the EIA process we will look at and consider the following types of mitigation to address identified effects:

- Preparation of a Freight Management Strategy (including routing of all HGVs via the A5025 to the south of the site)
- Preparation of an overarching travel plan to encourage take-up of sustainable transport options for staff and visitors, e.g. car sharing, mini-buses etc.
- Improve accessibility to the Wylfa Newydd Development Area by walking, cycling and public transport, to reduce the need to travel by car, especially single occupancy vehicles.
- For air quality mitigation measures see the Air Quality section within this Scoping Report.
- For noise mitigation measures see the Noise and Vibration section within this Scoping Report.

20.4 Proposed Scope, Methodology and Criteria

Part five of NPS EN-1 indicates that 'Projects with significant impacts should include a Transport Assessment as part of any application'. Consultation should be undertaken with relevant highway authorities on the scope of the assessment and any mitigation measures required. Applicants will be required to prepare a travel plan to mitigate transport impacts.

Paragraph 4.1.1 of Volume One of NPS EN-6 highlights that the national and local significance of a new nuclear build should be taken in to account, in particular the impact on significant infrastructure and resources such as motorways, major highways and the strategic rail network. Volume Two identifies a need to consider the potential impacts on PRoW and the need to avoid/minimise route bisection and re-routing.

The next steps will comprise the following tasks.

- Further consultation with IACC and the Welsh Government to inform the content and coverage of the traffic and transport assessments;
- A comprehensive review of the site preparation and clearance traffic movements to identify the extent of the mitigation required;
- Prepare preliminary traffic forecasts for all stages of the site preparation and clearance works; and
- Assess the implications of the preliminary forecast traffic increases and identify the potential need for and extent of mitigation works.

As part of the EIA process we will look at and consider the following types of mitigation to address identified effects:

20.4.1 Integrated Traffic and Transport Strategy

An Integrated Traffic and Transport Strategy (ITTS) is being prepared to support the development of the Wylfa Newydd Project, the objectives of which are to achieve:

- Provide a summary of construction workers and freight transport proposals during construction and operation,
- ensure integration with strategic public transport services;
- provide improved links to places of work;
- encouraged use of sustainable travel; and
- reductions in the need to travel.

The ITTS will specifically consider how the management of construction and operational traffic can be incorporated into the overall design of the Wylfa Newydd Project and how the transportation proposals align with current planning policy. The scope and content of the ITTS will be discussed and agreed with IACC and Welsh Government.

20.4.2 Study Area

The traffic and transport topic area includes consideration of all means of moving materials or people, and the existing conditions on the transportation networks. This could include road, rail, public transport, air, cycling and walking. Additional traffic or transport will be generated during the site preparation and clearance phase and could have the potential to cause disruption to the local transport network.

The topic study area is depicted in figure 20.2 above and encompasses the strategic routes to the Wylfa Newydd Development Area. Given that Anglesey is an island with limited access routes onto and through it, the topic study area for traffic and transport is considered to be the whole of the island, including Britannia Bridge. Dependent upon factors such as the origin location of the site preparation and clearance workers, the assessment may consider off island traffic impacts.

The following key sections of the road network on Anglesey and on the mainland were accordingly identified as comprising the study area, as shown in figure 15.01 below, which reflected the likely routes that would be used for both the movement of materials and workers as part of the Proposed Activities.

- A5025 from Valley Crossroads (A5/B4545/A5025) to the Wylfa Newydd Development Area - hereafter referred to as A5025 west;
- A5025 from the Wylfa Newydd Development Area up to and including Menai Bridge - hereafter referred to as A5025 east; and
- A55 leaving Holyhead town centre to Junction 11 (Bangor/Bethesda/A5/B4366).

The principal junctions of these routes are those listed in Table 20.1 above.

In addition, the following routes will also be captured within the traffic assessments, as they may be affected by additional traffic movements associated with the Construction and Operational Phases of the Power Station:

- Nanner Road,
- Cemlyn Road

- A minor road from the A5025 to Rhosgoch
- The B5114 Amlwch to Llangefni
- The A5114, A55 Junction 6 to Llangefni
- The B5109 Llanghenedl; and
- The A5 Valley to the A55 Junction 2.

20.4.3 Assessment Methodology

The principal guidance which will be followed in the assessment to date is the *Guidelines for the Environmental Assessment of Road Traffic,* produced by the Institute of Environmental Assessment (IEA[39]) 1993. These guidelines provide a methodology for assessing potentially significant traffic-related impacts on locations, areas and road users where a new development is considered likely to give rise to changes in traffic flows and flow composition. They also note that the assessment of transport impacts should include mitigation measures which are proposed to be implemented.

Reference will also be made to environmental assessment guidance presented in *Volume 11* of the *Design Manual for Roads and Bridges*, to assist the identification of user groups that are potentially sensitive to the types of impact associated with traffic flow changes.

Cognisance will be given to any transport plans and other transport guidance relevant to the modelling and assessment processes, including the New Nuclear Build at Wylfa Supplementary Planning Guidance (adopted July 2014) and the Anglesey and Gwynedd JLDP 2011-2026(draft Deposit Plan) .

20.4.4 Methodology for Traffic Modelling

A baseline traffic scenario will be developed to assess the potential effects of the different phased activities.

The baseline scenario represents the future conditions that would occur in the absence of the phased activities taking place. This scenario necessarily takes account of changes to traffic flows which are predicted to occur within the study area as a direct result of unrelated committed developments.

The baseline scenario will be developed using flow data from the extensive programme of traffic surveys undertaken in 2014 at representative locations within the study area, as outlined above. The surveyed flows will then be growthed to account for background increases in traffic (traffic growth) that would occur.

Committed developments comprise developments unrelated to the Project which have a valid planning consent, and which have the potential to impact existing traffic flows within the study area.

The predicted effects of the following identified developments will be considered accordingly as part of the baseline scenario:

- Conygar - Parc Cybi;

[39] Now the Institute of Environmental Management and Assessment (IEMA).

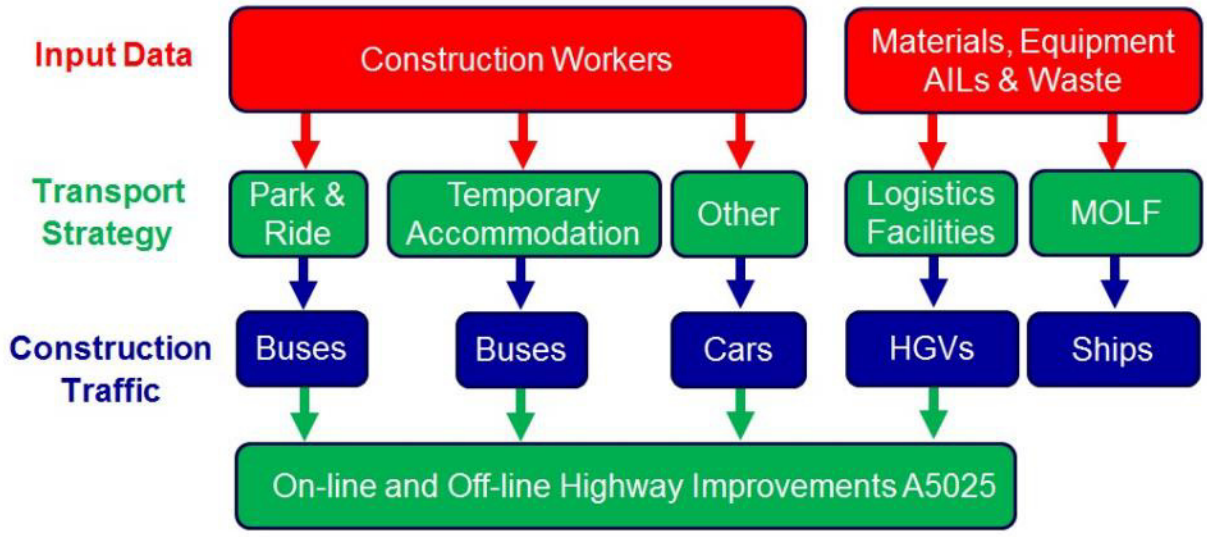
- Atlantis - Skerries Tidal Stream Array; and
- Lateral Power Ltd - Biomass power station.

Estimated traffic flows for these consented developments will be obtained from their associated planning application documentation. As the review of the documentation pertaining to the Skerries Tidal Stream Array did not identify any predicted traffic impacts associated with its development, this was not considered further in the modelling and analysis of the baseline scenario.

Decommissioning of the Existing Power Station is not currently considered to be committed development. Notwithstanding this, it is considered likely that the decommissioning process would be underway during the implementation of the phased activities. Accordingly, traffic associated with the decommissioning process has therefore been included in the baseline scenario.

Figure 20.4 below depicts the strategy for the construction phase, and demonstrates how the anticipated requirements for construction workers and materials have informed the identification of the above measures.

Figure 20.4 Overview of transport mitigation measures for the construction phase

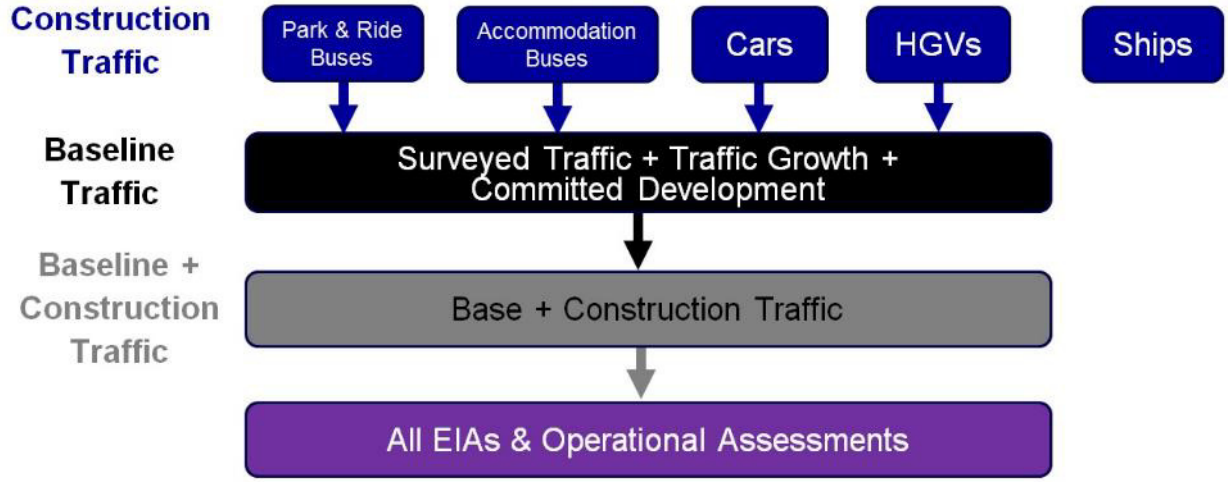


Baseline + construction traffic flows to be used in the assessment will be derived by way of spreadsheet-based modelling, based on a combination of the following input information:

- baseline - comprising growthed surveyed traffic (2014) and traffic flows associated with the identified committed developments and decommissioning of the Existing Power Station; and
- construction traffic - comprising that associated with the movement of workers, construction materials, AILs and waste.

Figure 20.5 below summarises this process.

Figure 20.5: Overview of methodology for deriving construction traffic (including baseline)



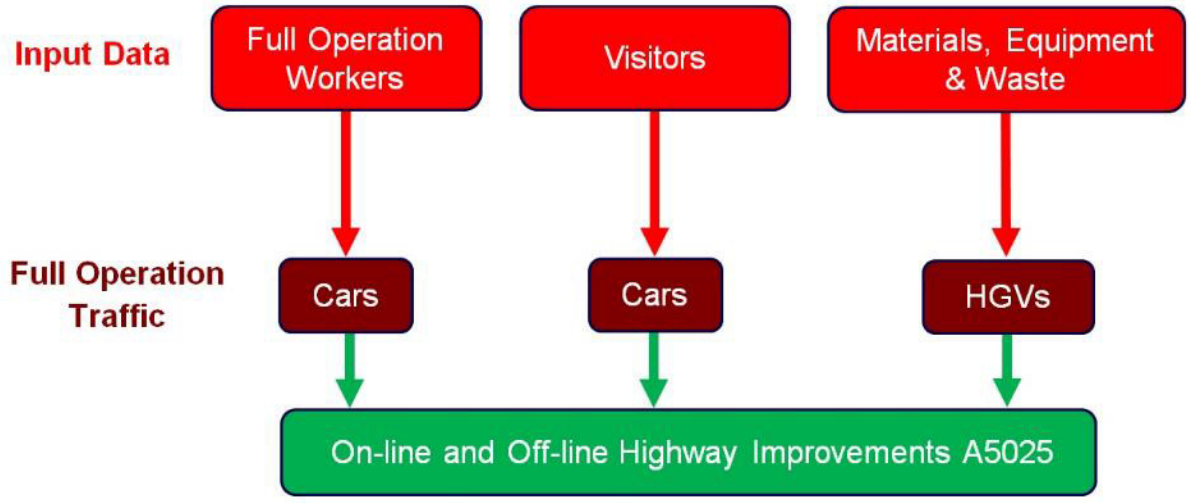
The Full Operation phase takes account of traffic generated as a result of workers and visitors travelling to and from the operating Generating Station.

Staff numbers are likely to be higher than associated with the current operation of the Existing Power Station. There is likely to be a small amount of traffic associated with the movement of operation materials, equipment and waste.

The transport strategy considered as part of the Full Operation phase is shown in Figure 20.6 below. The following mitigation measures would be retained from the construction phase during the Full Operation phase, and which will be modelled, are as follows:

- A5025 Highway Improvements - all Full Operation traffic is assumed to use the Off-line Highway Improvements;
- MOLF; and
- Logistics Centre.

Figure 20.6: Overview of transport mitigation measures for Full Operation phase



Baseline + Full Operation traffic flows to be used in the assessment will be derived by way of spreadsheet-based modelling, based on the following:

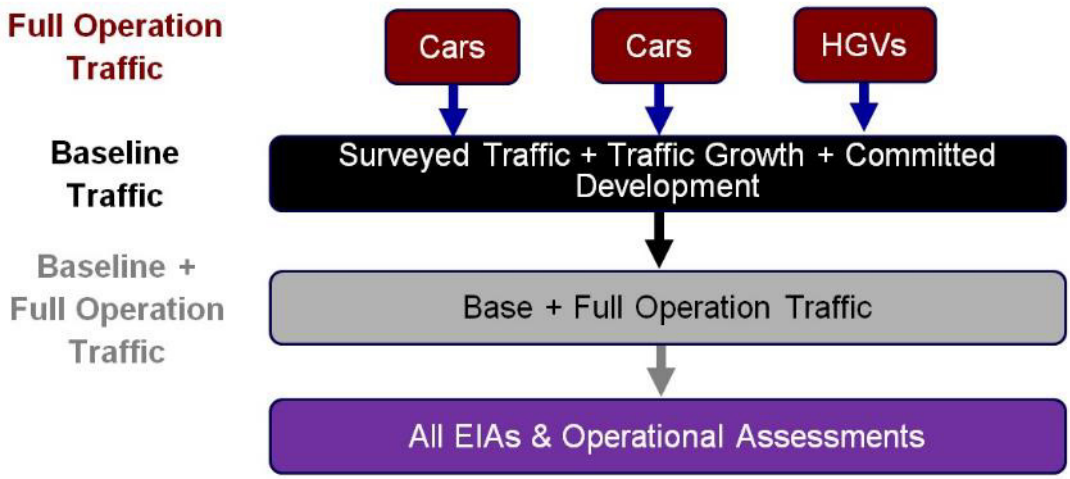
- Baseline - comprising growthed surveyed traffic (2014) and traffic flows associated with the identified committed developments and decommissioning of the Existing Power Station; and
- Full Operation traffic - comprising traffic associated with workers and visitors to the operational Generating Station.

Figure 20.7 below summarises this process.

Outputs from the traffic model will be used to inform a number of other environmental assessments including air quality, noise and vibration, and public access and recreation.

- 24 Hour Annual Average Daily Traffic (AADT);
- 18 Hour Annual Average Weekday Traffic (AAWT);
- HGV percentage; and
- speed range.

Figure 20.7: Overview of methodology for deriving Full Operation traffic (including baseline)



20.4.5 Methodology for Air Travel

Estimates will be made of the likely numbers of workers and specialist visitors who would travel from abroad and use airports to travel to or from Anglesey in both the construction and full operation phases. Estimates will also be made of those who may use Anglesey Airport via connecting flights from Cardiff Airport.

20.4.6 Methodology for Rail Travel

Estimates will be made of the likely numbers of workers who could use rail as part of their fortnightly travel. Workers will be advised to travel to Holyhead railway station from where shuttle bus services would transport them to their accommodation or to the Power Station Site. Estimates will also be made of the likely numbers of workers who could use rail as part of their

daily commute and those who would travel by air into the UK and complete their journeys by rail.

20.4.7 Methodology for shipping

Feasibility assessments have been undertaken to estimate the number of ships expected to arrive by sea using the MOLF. The methodology for this has taken the relevant tonnages of materials required to construct the first generating unit, profiled them over the expected timescale of such deliveries (quarter by quarter), and divided the resultant quarterly tonnages by the payloads of the associated ships. This derives the expected quarterly number of ships. The same profile was then overlaid for the second generating unit to give the expected number of ships for constructing both generating units combined.

20.4.8 Methodology for Bus Travel

As described above, an extensive bus-based transport strategy is being developed for transporting workers to the Wylfa Newydd Development Area. There are also opportunities to provide an enhanced bus service between Holyhead, Valley and Amlwch via the Wylfa Newydd Development Area.

20.4.9 Methodology for Walking and Cycling

Estimates will be made of the likely numbers of workers who could walk or cycle as part of their daily commute based upon those workers likely to live within the walking and cycling distances stated in the Walking and Cycling Strategy for Wales.

20.4.10 Methodology for Driver Stress

The methodology for the assessment of driver stress will follow that contained in DMRB.

20.4.11 Methodology for Vehicle Journey Times

Junction operational assessments will be undertaken at key junctions to assess the change in journey times with the Project in place. The scope of the assessment has focused on identifying changes to existing journey times for drivers, passengers and NMUs on the A55 and A5025 routes within the study area using qualitative techniques and professional judgement. Emphasis has been placed on evaluating effects where there is a predicted change in traffic flows and/or speeds of an order that could result in marked delays.

20.4.12 Methodology for Severance

Volume 11 of the DMRB provides guidance and indicative thresholds for the assessment of existing levels of severance imposed by traffic on communities, and notes that an assessment of severance is normally not required where traffic flows are relatively low, i.e. roads carrying below 8,000 AADT.

The IEA guidelines set out a range of indicators for determining the effect of severance. Changes in traffic flows of 30%, 60% and 90% are regarded as giving rise to low, medium and high effects respectively. These indicators, together with a qualitative review of specific local conditions, such as the provision of footways, have been used to determine the likely effects of traffic-related severance on NMUs.

Although the 8,000 AADT parameter provides a benchmark for establishing where severance may be apparent, this has not been applied in the assessment due to the rural nature of the study area. This is because changes of, for example, 90% on rural roads that presently carry relatively low flows are considered likely to give rise to a greater perceptible change in severance than a road carrying over 8,000 AADT that experiences a change of 30%.

The scope of the assessment has accordingly focused on evaluating the following:

- the levels of severance currently imposed on NMUs by existing traffic on the A55 and A5025 routes within the study area; and
- the potential for relief from severance, or for new severance to be imposed on users, that could arise as a result of traffic flow changes on these two routes associated with the implementation of the Proposed Activities.

The assessment has been undertaken by way of reference to existing and future forecast traffic flows relating to the A55 and A5025 routes within the study area, where they have a direct relationship to local communities and the facilities people use.

20.4.13 Methodology for Accidents and Safety

As there are no general thresholds for determining the significance of increased traffic on highway safety, professional judgement and qualitative assessment techniques have been used to determine the likely changes in accident risk and safety. The assessment has been undertaken using information contained within the accident records, national statistics, by way of a review of the characteristics of the routes, and the type and quantity of traffic likely to be generated by the Proposed Activities.

21 Cumulative Effects

21.1 Background

Horizon is proposing to make an application for a DCO to build a new nuclear power station on land identified in NPS EN-6 at Wylfa, Anglesey.

One of the key components of the DCO application will be an Environmental Statement documenting the EIA undertaken on the project. As part of the EIA a CIA will be undertaken.

The Wylfa Newydd Project is made up of a number of discrete developments which all combine to facilitate the construction and operation of a new nuclear power station. Much of the Project will be incorporated within the DCO application, with other developments being consented under the Town and Country Planning Act 1990 through the submission of planning applications to the IACC or through a marine licence under the Marine and Coastal Access Act 2009. At the current time, the Wylfa Newydd Project (the Project) can be split in to the following developments, broadly listed in the order in which applications (if required) are expected to be submitted:

- Highways improvements to the A5025 – TCPA planning application.
- Site preparation and clearance – TCPA planning application.
- Off-Site worker accommodation – TCPA planning application.
- Logistics Centre – TCPA planning application.
- Off-Site Park and Ride – TCPA planning application.
- Works and structures in the marine environment – marine licence application.
- Main power station construction and operation – DCO application.

At each stage, for each development within the Project where an EIA is required, cumulative impacts will be assessed and reported. The CIA submitted with each environmental statement will report on all of the cumulative effects identified at that time arising from the Project and with other projects. The approach to delivering CIA is described in more detail in the following sections.

21.2 Proposed Approach

Horizon's proposed approach to the assessment of cumulative effects is summarised in table 21.1. Further details of each step are provided in the following sections. Horizon is currently in the process of completing step five through the submission of this Scoping Report.

Table 21.1: CIA process

CIA Step	Proposed approach
Step 1	Define 'cumulative effects' in relation to the Project and outline the approach to the assessment of cumulative effects.
Step 2	Define the temporal and spatial limits of the project. Discipline specific EIA study areas / zones of influence. Habitat Regulations Assessment study area. Project timeline.
Step 3	Identify other past, present and reasonably foreseeable future projects (RFFP) as a long-list.

CIA Step	Proposed approach
	Understanding the status of RFFP and status of impact assessments undertaken. Compare study areas / zone of influence where possible. Compare project timelines.
Step 4	Describe the baseline and establish receptor sensitivity. Establish the sensitivity of the receptors and define thresholds. Define and describe the baseline.
Step 5 (current step)	Scoping of cumulative impacts. Temporal scoping: scope out those RFFP or impacts which are not temporally aligned. Spatial scoping: scope out those RFFP or impacts which are not spatially aligned. Source – Pathway – Receptor: scope out those RFFP or impacts where there is no relationship or linkage which could lead to a cumulative impact (adopt a conservative approach to removing RFFPs or impacts). Remaining RFFP comprise a 'short-list' for inclusion in the assessment as there is a potential for cumulative effects to occur. Preparation of a CIA Scoping Report, submission to Planning Inspectorate and / or the IACC.
Step 6	Assess the significance of cumulative effects. Additive, synergistic and indirect.
Step 7	Modify or add alternatives, or propose (additional) mitigation to avoid or reduce cumulative effects. Work with other developers to share the burden of additional mitigation identified.
Step 8	Documentation of the assessment in a CIA Report included within the relevant Environmental Statement. Include details on the uncertainty and limitations in the assessment.
Step 9	Make recommendations for monitoring and management of cumulative effects via an Environmental Management Plan.

It is important to note that steps one to five are likely to be iterative as effects are identified and the scope of the CIA is refined.

It is anticipated that the approach to CIA as outlined in table 21.1 will be applied to all EIAs undertaken as part of the Project. As the Wylfa Newydd Project progresses, Horizon will work through the cumulative assessment process and will engage with key stakeholders at appropriate times.

21.2.1 Step 1: definitions and approach

Cumulative effects can be described as those effects which result from incremental changes of an activity when added to other past, present and reasonably foreseeable future activity.

CIAs are, by their nature, are complicated. They require the collation of impacts from a number of different sources followed by the assessment of the cumulative impacts which may arise. There are a significant number of different combinations which can result in cumulative impacts. Consequently, CIA is a process which is heavily reliant on professional judgement.

21.2.1.1 Guidance

The proposed approach to undertaking and reporting the cumulative assessment has been developed following a review of current guidance documents and recent examples of cumulative assessments undertaken by others. These were:

- A methodology being championed by Oxford Brookes and presented at a training course title Cumulative (Environmental) Impact Assessment, held on 10th March 2015. This methodology is also closely linked to the approach presented in the renewable UK guidance document "*Cumulative Impact Assessment Guidelines*".
- Guidance provided by Natural England focussing on CIA related to Marine Protected Areas, but of relevance across a broad range of CIAs.
- A draft approach and methodology on Environmental and Cumulative Impact Assessment provided by the IACC, dated July 2014.

21.2.1.2 Terminology

To aid the understanding of cumulative effects the following terms are to be used within assessments.

- **Project**: the overall scheme, e.g. the Wylfa Newydd Project (construction, operation and decommissioning of the Generating Station and all Associated Development). Other development projects not forming part of the Project are also referred to, e.g. a wind farm being promoted by a separate developer.
- **Development**: individual elements of the Project, such as construction of the new nuclear power station, improvement of the A5025 or construction and operation of Park and Ride facilities; and
- **Activity**: Individual tasks within a development, such as vegetation clearance along the A5025 corridor, or soil stripping as part of site preparation and clearance in the Wylfa Newydd Development Area.

Cumulative effects can potentially occur at each level (activity, development or project), for example, cumulative effects can arise from different activities (but within the same development), from different developments (within the same project), or across different projects.

The following terminology has been adopted to describe cumulative effects associated with the Wylfa Newydd Project.

- **Intra-development**: Cumulative effects can arise when a single resource or receptor is affected by more than one impact from the same development, usually at the same time. For example, noise and dust arising from site preparation and clearance works may combine to have an effect on nesting birds close to the site. These cumulative effects will be assessed within and between the individual topic chapters of the relevant environmental statement and reported in CIAs.
- **Intra-project**: In a complex project involving multiple developments, such as the Wylfa Newydd Project, cumulative effects can arise when a single resource or receptor is affected by impacts from different developments (in the same project) at the same time. For example, noise from site preparation and clearance and light pollution from A5025

highway construction could combine to have an effect on bats feeding in the area. This group of cumulative effects could also be termed 'inter-development'.

- **Inter-project**: Cumulative effects can arise when a single resource or receptor is affected by more than one project at the same time. For example, noise from construction of the Wylfa Newydd nuclear power station and noise from the construction of a new National Grid overhead power line could combine to have a cumulative effect on local residents.

Cumulative effects can be additive or combined, and these terms are discussed below.

- **Additive**: Additive impacts occur when similar types of impact from different developments or projects have an effect on a single environmental resource or receptor at the same time and in a similar way. The individual impacts from a single development or project may not result in a significant effect on their own but when added with impacts from other developments or projects could become significant. For example, two separate projects both producing insignificant amounts of dust at the same time could combine to cause a significant dust nuisance.
- **Combined**: Combined (or synergistic) impacts occur when different types of impacts from different developments or projects combine to have an effect on a specific receptor or resource. The individual impacts may not cause a significant effect when considered in isolation, but when combined with other impacts could generate significant effects. For example, the generation of light and noise from construction activities on one project could combine with the presence of new physical structures associated with a different project, none of which might be individually assessed as being significant, but which in combination might significantly affect the behaviour of bats.

21.2.2 Step 2: temporal and spatial limits

Determination of the temporal and spatial limit of the Wylfa Newydd Project is necessary to ensure that those activities with a potential to contribute to a cumulative effect, but that do not occur within the same spatio-temporal scale (i.e. not at the same time or in the same geographic area) as other developments or projects, are not scoped in for further consideration. The temporal and spatial limits of the Project need to be defined, including:

- topic specific EIA study areas / zones of influence;
- Habitat Regulations Assessment (HRA) study area; and.
- project timeline.

The topic specific study areas are taken directly from the individual topic chapter in this. All topic study areas were overlain on one map to identify the widest possible spatial extent where effects are expected to occur. In addition, the study area being used for Habitats Regulations Assessment (HRA) has been considered to identify any further areas where there is potential for cumulative effects.

21.2.2.1 Temporal Limits

The temporal limits of the Wylfa Newydd Project are well defined and understood, with a reasonable level of certainty over the construction schedule and operational lifetime of the Power Station. The current project timescale is presented in figure 3.3. This timeline has been

used to compare against other projects (inter-project) to determine if there is a temporal connection. Where there is no clear temporal link between the Wylfa Newydd Project and a project in the RFFP long-list, that project has been scoped out of the CIA. The progression from RFFP long-lost to RFFP short-list is presented in section 21.2.3.

The main construction works covered under the DCO have a significant temporal overlap with all Associated Developments. Similarly, the different Associated Developments all have temporal overlaps with each other to some degree. The exception to this is that the online highway improvements do not overlap with any of the other Associated Developments, however, it is considered to be close enough temporally to all other developments to include in the intra-project CIA.

21.2.2.2 Spatial Limits

The spatial limit of the Wylfa Newydd Project is presented in figure 21.1. For scoping purposes, the full spatial extent is the study areas from all environmental topics. In addition, the study area being used for HRA has been considered to identify any further areas where there is potential for cumulative effects.

The spatial extent that has been used to compare against other projects (inter-project) to determine if there is a spatial connection is the combined study areas from the DCO topic assessments and the TCPA topic assessments. Where there remains uncertainty over the location of Off-Site developments (for which there are expected to be TCPA applications) a conservative approach has been adopted and all potential locations have been included to define the greatest possible spatial limit. For assessment purposes, individual topics have reviewed their own study area with the information available on RFFP short-list projects to determine if there are any cumulative effects. The spatial limit as defined by the combined study areas is included in figure 21.2.

Figure 21.1: Spatial limit of Wylfa Newydd Project

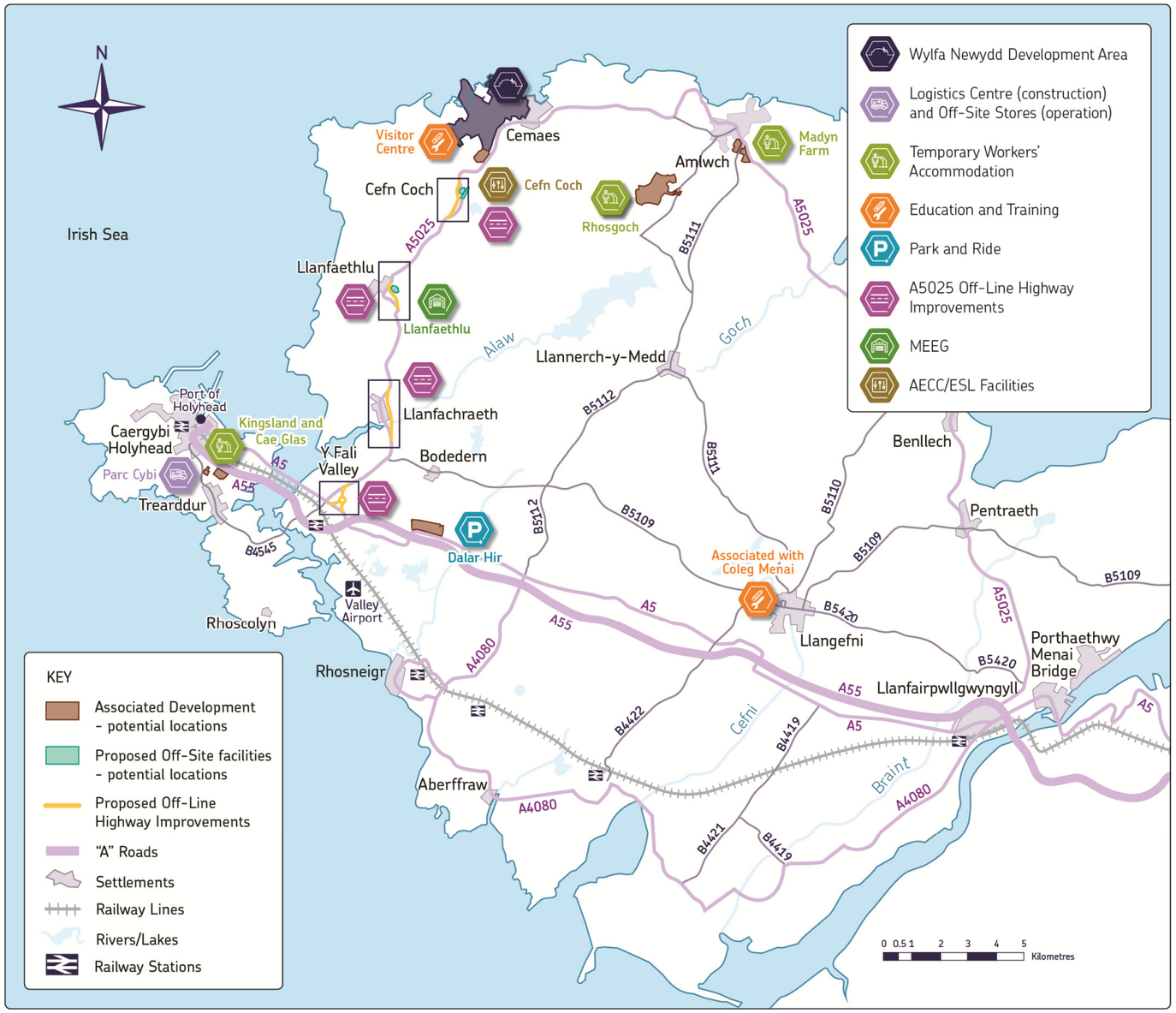
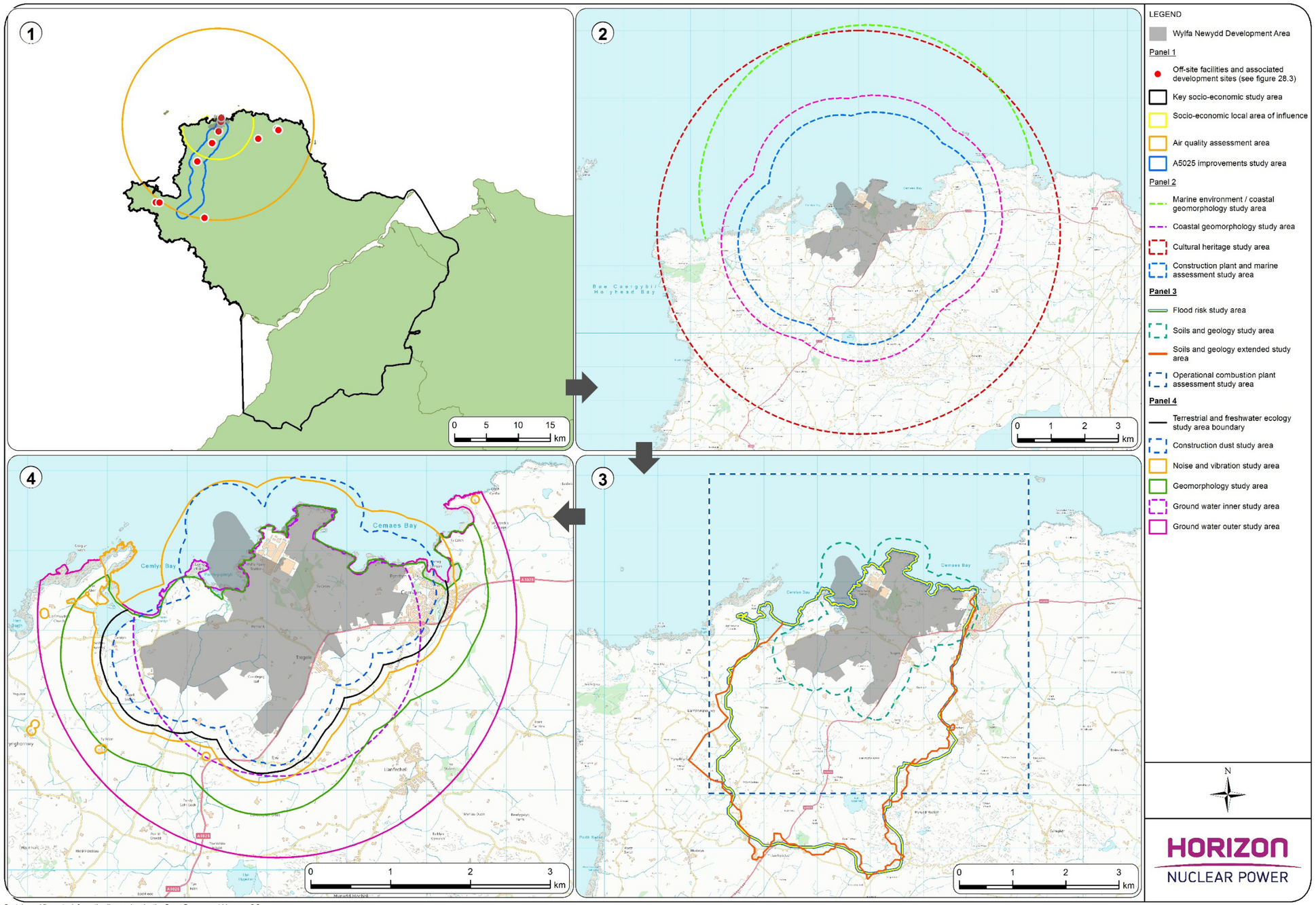


Figure 21.2 Combined study area for CIA



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It is important that the spatial limit is flexible and not strictly limited to boundaries defined by topic study areas. In particular, it will be necessary to acknowledge the spatial extent of the receptors being considered (e.g. total extent of habitat, or species distribution), as other projects may also have impacts on those receptors which may or may not occur in overlapping areas. This will be included in the CIA through the application of professional judgement.

It is assumed that all of the different developments within the Wylfa Newydd Project (intra-project) have a spatial connection. As such, from a temporal and spatial perspective all developments within the Project are scoped in to the intra-project CIA.

21.2.3 Step 3: Reasonably foreseeable future projects long-list

A key part of the CIA process is to identify those other projects that could give rise to cumulative impacts. These are referred to as RFFPs but also include past and present projects. It is considered good practice to develop a long-list of RFFPs in the first instance to include all past, present and reasonably foreseeable future projects that could reasonably be expected to have a spatial or temporal link with the Wylfa Newydd Project.

Past projects will generally be included in the environmental baseline and will only be included in the long-list of RFFPs where the actual impacts of the project are still being determined through monitoring and measurement, or where they are undertaken in the time between the baseline information being collected and the assessment being undertaken.

As the CIA progresses and more information are made available on likely impacts, receptor sensitivity, and potential linkages between projects, it is anticipated that the long-list will be reduced. The ultimate aim is to produce a list of projects that, along with the Wylfa Newydd Project, have the potential to result in cumulative impacts. Table 21.3, at the end of this section, provides the current long-list giving a description of the project, its current status and provides a justification of why each project is scoped in or out of the CIA assessment. Horizon expects significant stakeholder engagement on this RFFP long-list to ensure all applicable projects are included.

21.2.3.1 Identification of reasonably foreseeable future projects

An initial long-list of RFFP has been identified (table 21.3) from an extensive search of on-going or upcoming projects across a wide geographical area initially. The initial areas from which potential projects were identified are listed below along with the codes used in the RFFP long-list.

- Anglesey – AN.
- Gwynedd – GW.
- Conwy – CN.
- Denbighshire – DN.
- Flintshire – FL.
- Ceredigion – CR.
- Pembrokeshire – PM.
- Cheshire West and Chester – CW.
- Wirral – WR.
- Liverpool – LV.

- Sefton – SF.
- Isle of Man – IM.
- Republic of Ireland (Dublin and Wicklow) – RI.

Different criteria have been applied when reviewing projects in different geographic regions. For example, in areas close to the development sites a wide range of project types have been considered for inclusion in the RFFP long-list, from large scale housing developments to major infrastructure projects. Whereas, in areas further away from the development sites a much smaller range of project types has been considered for inclusion, largely focussed on those projects which may have a significant socio-economic effect in the North Wales region or coastal projects which may have a significant effect on the marine environment. This is summarised in table 21.2 below.

In addition, consideration has been given to other new nuclear power station projects within the RFFP long-list. It is noted that there is likely to be concern in relation to the potential combined effects of the UKs new generation of nuclear power stations. Therefore, it is considered appropriate to include other new nuclear power stations in the RFFP long-list and potentially the short-list.

Table 21.2: Criteria for identification of RFFP in different geographic regions

Geographic Region	Projects Included in the RFFP Long-list
Anglesey	All projects subject to EIA. On rare occasions, projects that are not subject to EIA but are so close to a development site that a cumulative effect is highly likely.
Gwynedd, Conwy	All projects subject to EIA, but focussing on those projects likely to have socio-economic and traffic and transport effects, or coastal projects likely to have effects on the marine environment.
Denbighshire, Flintshire, Ceredigion, Pembrokeshire, Cheshire West and Chester, Wirral, Liverpool, Sefton, Isle of Man, Republic of Ireland (Dublin and Wicklow)	Major infrastructure projects which are likely to have significant socio-economic effects in the North Wales region or coastal projects which may have a significant effect on the marine environment.

21.2.4 Step 4: Baseline and receptors

It is important in a CIA, as with any EIA, to describe the baseline against which the assessment is being undertaken and establish receptor sensitivity. The baseline used for the CIA will be the same as that used for the environmental assessments, as reported in chapters 8-20. Similarly, the receptors and resources identified for the environmental topics will be the same receptors and resources considered in the CIA.

21.2.5 Step 5: Scoping

The primary purpose of CIA scoping is to compare the Wylfa Newydd Project with all other projects in the RFFP long-list and determine whether there is the potential for a spatial and temporal link which could result in a cumulative effect. Table 21.3 provides the current long-list giving a description of the project, its current status and provides a justification of why each project is scoped in or out of the CIA assessment.

For the scoping of cumulative impacts the following process has been applied:

- Temporal scoping: scope out those RFFPs which are not temporally aligned.
- Spatial scoping: scope out those RFFPs which are not spatially aligned.
- Source – Pathway – Receptor: scope out those RFFPs where there is no relationship or linkage which could lead to a cumulative impact (adopting a conservative approach to removing RFFPs).
- The remaining RFFP comprise a 'short-list' for inclusion in the assessment as there is a potential for cumulative effects to occur.

Table 21.4 following table 21.3, provides the current short-list which is derived from the long-list. Where projects have been scoped out, Horizon will continue to monitor them to make sure any changes and identified and the project reassessed. For example, some projects have been scoped out because they are not funded or have failed to obtain planning consent. If these conditions change the project will be reviewed to determine if it should be moved in to the RFFP short-list.

Table 21.3 Reasonably foreseeable future projects long-list and scoping

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
AN01	Magnox Limited	Wylfa Decommissioning Decommissioning of the Existing Power Station (Wylfa) including care and maintenance of the existing facilities followed by decommissioning and final site clearance.	Plans are in place for the decommissioning of the Existing Power Station and an Environmental Statement (2013 Update) has been prepared – http://www.hse.gov.uk/consult/condocs/cdwylfa/2013-environmental-statement.pdf Decommissioning activities are understood to be undertaken between 2017 and 2025. Magnox are currently updating the plans for decommissioning and the Environmental Statement.	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction activities and Magnox's proposed decommissioning activities.
AN02	Lateral Power Limited	Anglesey Eco Park Construction and operation of a wood pellet burning power plant, expected to generate 299MW of electricity.	Outline planning permission is in place. A full planning application for the eco-park is due to be submitted in 2016 and is expected to have an accompanying Environmental Statement. A current assumption is that the site will be operational in 2017.	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Lateral Power's proposed construction and operation.
AN03	Eco Pellets Limited	Llangefni Wood Biomass Plant Construction and operation of a wood pellet burning power	Planning Application rejected and subsequently appealed. The appeal was dismissed by the Planning Inspectorate in July 2014. An Environmental Statement	Potential	No	Out	Although there is a potential spatial link between the proposed Llangefni Wood Biomass Plant and the Wyfla Newydd Project there is no

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		plant, expected to generate 30MW of electricity.	accompanied the Planning Application; however, at the time of writing it was not available online.				temporal link as the Llangefni Wood Biomass Plant has failed in its planning application attempts.
AN04	Land and Lakes	Penrhos Leisure Village A leisure village at Penrhos Coastal Park; a leisure village at Cae Glas, Parc Cybi, (used initially as a temporary construction workers accommodation complex); and a residential development of up to 320 new houses at Kingsland (used initially to provide accommodation for construction workers).	Planning permission is in place and agreement reached with the IACC on community fees. An Environmental Statement is available that accompanied the Planning Application. A summarised Land and Lakes project brochure was available at the time of writing - http://www.landandlakes.co.uk/tourism-development/brochure.html	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Land and Lakes' proposed construction and operation.
AN05	Conygar Stena Line Ltd	Holyhead Waterfront Redevelopment A comprehensive mixed use development on 1.2km of Holyhead waterfront at Newry Beach and Porth y felin.	Planning permission granted in 2012. Subsequently awaiting the outcome of a 'village green' application. An Environmental Statement is believed to have accompanied the Planning Application. At the time of writing the Environmental Statement was not available online.	Yes	Potential	In	Inter-Project cumulative effects are possible as a result the Wylfa Newydd Project's construction and operation and Conygar Stena Line's proposed construction and operation.
AN06	Conygar	Parc Cybi Stage 2	Outline planning permission is in	Yes	Potential	In	Inter-Project cumulative

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		Mixed use employment developments, primarily distribution and warehousing space on the southern edge of Holyhead alongside the A55.	place. A full planning application for the Stage 2 works is expected to be submitted in 2016 and is expected to have an accompanying Environmental Statement.				effects are possible as a result the Wylfa Newydd Project's construction and operation and Conygar's proposed construction and operation.
AN07	National Grid	North Wales Connection Project A new connection for new energy generation in North Wales. Potential new generation includes the proposed Wylfa Newydd power station as well as a number of renewable energy projects.	National Grid has a preferred corridor for a new electrical connection between the Wylfa substation and the Pentir substation. Environmental information is expected to be available as National Grid progress with defining their route alignment. An Environmental Statement is not expected to be available prior to Horizon submission of the DCO application.	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and National Grid's proposed construction and operation.
AN08	TPG Wind Limited (a joint venture between E.ON and Eurus Energy UK Ltd)	Rhyd-y-Groes Repower The current wind Rhyd-y-Groes Wind Farm, located near the northern shores of Anglesey in Wales, has 22 turbines with a maximum total power output of 6.6MW. Proposals are to	A planning application has been submitted. The accompanying Environmental Statement is available online - https://www.eonenergy.com/About-eon/our-company/generation/planning-for-the-future/wind/onshore/rhyd-y-groes-repower/project-information The construction period for the	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and TPG Wind's proposed construction and operation. Horizon will continue to monitor the Rhyd-y-Groes Repower project to identify

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		replace the current turbines with up to 13 modern turbines, which could produce up to 11.7MW of renewable energy.	proposed development is envisaged to last 12 months and the proposed decommissioning of the existing windfarm could take up to 6 months. There is scope for decommissioning and construction timetables to overlap. Although construction phasing is known the scheduled start date is unknown.				the likely start date.
AN09	M-SParc	Menai Science Park A new science park located on the outskirts of Gaerwen. Being developed as a location for industry facing research projects, SMEs and Corporates, to drive growth in knowledge-based science in North West Wales.	Outline planning consent has been granted, M-SParc are progressing with the full planning application. An accompanying Environmental Statement is expected.	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and M-SParc's proposed construction and operation.
AN10	Amlwch LNG	Amlwch LNG Tankers would import liquid gas to a mooring three kilometres from the Amlwch coast. The gas would then be transferred by an	The existing planning consent renewed in 2013, but future plans are unclear and timescales undefined. The planning application is expected to have had an accompanying Environmental Statement. At the time of writing	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Amlwch LNG's proposed construction and operation.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		undersea pipeline from the mooring platform to the site near the town of Amlwch, where it would be converted back to natural gas and sent into the UK gas network.	the Environmental Statement was not available online.				Horizon will continue to monitor the Amlwch LNG project to identify the likelihood of it progressing.
AN11	Minesto	Holyhead Deep 10 MW Tidal kite installation off the coast of Holyhead.	An EIA Screening Opinion has been requested. The planning application is to be accompanied by an Environmental Statement which is currently under production. Minesto plans the installation of a 10MW marine energy array in 2017.	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Holyhead Deep's proposed construction and operation. Horizon will continue to monitor the Holyhead Deep project to identify the likelihood of it progressing.
AN12	Menter Môn	West Anglesey Demonstration Zone Menter Môn has been awarded a long-term lease to manage an area of seabed off the west coast in order to develop the marine energy sector. Currently looking for	Marine and land planning is not currently in place. Based on Minesto's Holyhead Deep 10 MW project an Environmental Statement is likely to be required for this development.	Yes	No	Out	No project has yet been identified in the West Anglesey Demonstration Zone; therefore it is scoped out at this time.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		developers / technology companies.					
AN13	IACC	Holyhead Primary School New primary school planned to replace Ysgol y Parchedig Thomas Ellis, Ysgol y Parc and Ysgol Llaingoch schools. To be built on the former Ysgol Cybi site in Holyhead.	The planning application was submitted in May 2015 and is assumed to include an EIA. At the time of writing the Environmental Statement was not available online.	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Holyhead Primary School's proposed construction and operation.
AN14	IACC	Llanfaethlu Primary School Plans for a new primary school to replace Ysgol Cylch y Garn, Ysgol Ffrwd Win and Ysgol Llanfachraeth.	No planning application submitted at present, however, the proposal site has been identified and funding has being agreed. The planning application is expected to have an accompanying Environmental Statement, the status of which is currently unknown.	Yes	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Llanfaethlu Primary School's proposed construction and operation.
AN15	IACC	Llangefni Link Road Scheme The IACC is proposing a new 2.5km link road around the eastern side of Llangefni to enable traffic to more freely access the industrial	A planning consent granted for the Llangefni Link Road scheme including a gateway roundabout to the town. The final planning application is assumed to have included an Environmental Statement. Environmental information can be	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and the Llangefni Link Road's proposed construction and operation.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		estate in Coleg Menai and reduce expected traffic in Llangefni town centre.	found at - http://www.anglesey.gov.uk/council-and-democracy/consultations/previous-consultations/llangefni-link-road-scheme-share-your-views/124068.article The project's construction is likely to be phased, commencing 2015-2016.				
AN16	DU Construction	DU Construction is building a new operational centre on Penrhos Industrial Estate, Holyhead.	Planning application approved and construction works are planned to start in 2015. The planning application is assumed to Hve included an Environmental Statement.	Potential	No	Out	It is anticipated that the DU Construction operational centre will be complete prior to Horizon construction activities commencing. In addition, the scheme is a relatively small development that is not closely linked spatially with the Wylfa Newydd Project.
AN17	Anglesey Council	Anglesey Council has announced plans to take control of up to 500 homes in the next 30 years. This is likely to involve the construction of 300 council houses.	Announcement of plans only (February 2015).	Yes	No	Out	No project has yet been identified to deliver the housing plans; therefore it is scoped out at this time.
AN18	Energy	Erection of one 100kw	EIA Screening Opinion submitted	No	Potential	Out	No spatial link and a small

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
	Consultants Wales	wind turbine with a maximum hub height of up to 36m, rotor diameter of up to 24m and a maximum upright vertical tip height of up to 48m together with the construction of an access track on land near Ty'n Rallt, Bodorgan.	to the IACC Planning Application Ref: 15C75G/SCR				scale project; therefore it is scoped out at this time.
AN19	McCarthy & Stone	McCarthy & Stone propose to demolish a former hotel; Plas Glanrafon Hotel in Anglesey and build 34 self-contained apartments.	In planning stages and public consultation events have been held in July 2015. At the time of writing no environmental information or assessment was located online. The IACC is expected to make a decision on the proposal in 2015.	No	No	Out	No spatial link and project likely to be completed in advance of Wylfa Newydd Construction; therefore scoped out at this time.
AN20	Utilities companies (various)	Removal (and in some instances replacement) of services currently in place on the Wylfa Newydd Development Area	Plans are in place to remove or replace existing services, e.g. electrical cables, which are currently installed on the Wylfa Newydd Development Area. This work is expected to be carried out by the relevant utilities companies under Permitted Development rights and funded by Horizon.	Yes	Yes	In	Inter-project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and the removal of existing services from the Wylfa Newydd Development Area.
GW0	Snowdonia	Glyn Rhonwy Pumped	A development consent order	Potential	Yes	In	Inter-Project cumulative

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
1	Pumped Hydro Limited	Storage Construction and operation of a 600MWh pumped storage scheme, with a generating capacity of 99.9MW, at the Glyn Rhonwy and Chwarel Fawr quarries, near Llanberis, Gwynedd.	application is expected to be submitted to the Planning Inspectorate in 2015 and is expected to have an accompanying Environmental Statement.				effects are possible as a result of the Wylfa Newydd Project's construction and operation and Glyn Rhonwy's proposed construction and operation.
GW02	Gwynedd Council	A487 Caernarfon to Bontnewydd Bypass A new 9.8km highway commencing at the Goat roundabout (A499/487 junction) and terminating at the Plas Menai roundabout. The new route will have 22 separate structures including seven bridges.	In planning stages with public consultation events held in June 2015. Construction is planned to commence at the end of 2016. An Environmental Statement is assumed to be under production at present.	Potential	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and A487 Bypass' proposed construction and operation.
GW03	Gwynedd Council	Ysgol Hafod Lon Newydd School, Penrhyndeudraeth, Gwynedd A new school for pupils with special educational needs from the	The planning application was approved by Gwynedd Council. Construction work began in March 2015 and is due for completion in September 2016. At the time of writing no environmental information or	No	No	Out	The construction of the Ysgol Hafod Lon Newydd School would be completed in advance of Wylfa Newydd construction. There are no anticipated spatial or temporal links, therefore the

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		Meirionnydd and Dwyfor areas of the county.	assessment was located online.				Ysgol Hafod Lon Newydd School scoped out at this time.
CN01	Conwy County Borough Council	Demolition of Colwyn Bay's Victoria Pier.	A planning application (ref 0/41462) and listed building consent application (ref 0/41463) were submitted and registered in May 2015. The construction timetable is unknown. At the time of writing no environmental information or assessment was located online.	Potential	Potential	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and the demolition of Colwyn Bay's Victoria Pier.
DN01	Memoria Ltd	Memoria Ltd intends to build a crematorium facility on land near Glascoed Road in St Asaph, Denbighshire.	Planning Approved. Memoria has a planned opening date of Spring 2016. An EIA Screening Opinion was undertaken in accordance with the Town & Country Planning (Environmental Impact Assessment) Regulations 2011, to ascertain whether the proposal would be subject to the requirement for an EIA. It was concluded in accordance with Regulation 2(1) that an EIA was not required with ecological, transport, landscape and other site specific issues assessed through	No	No	Out	The construction of the crematorium would be completed in advance of Wylfa Newydd construction. As there are no anticipated spatial or temporal links with the Wylfa Newydd Project, the Memoria Ltd crematorium is scoped out at this time.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
			the submission of separate reports. Environmental information is available online - http://cyfarfodyddpwyllgor.siryfflint.gov.uk/documents/s28173/052334%20-%20Full%20Application%20-%20Construction%20of%20a%20New%20Crematorium%20Associated%20Car%20Parks%20Access%20Road%20and.pdf?LLL=undefined				
FL01	Wheelabrator Technologies	Parc Adfer Energy Recovery Facility The construction and operation of an Energy Recovery Facility and ancillary facilities, comprising offices and welfare facilities, visitor centre, bottom ash recycling and maturation facilities, access roads and weighbridge facilities, electrical compound, together with peripheral landscaping and security fencing. The proposals also make provision for a rail connection.	Planning Approved 09/06/2015 (Planning Application Ref: 052626). The Environmental Statement is available online - http://www.flintshire.gov.uk/dominoimgs/tranplan/planup.nsf/0/E2CC5045DA28DCA980257D510032298F/$file/052626%20Environmental%20Statement%20Contents.pdf The construction phase is expected to last 3 years and is due to start late 2015, early 2016.	No	Yes	Out	No spatial link is present with the Parc Adfer Energy Recovery Facility, therefore it is scoped out at this time.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		ERF, Deeside Industrial Park, Weighbridge Road, Sealand, Flintshire.					
CR01	Chelverton	A multi-million' pound development of Aberystwyth's Mill Street, including two superstores has been approved by councillors.	Cyngor Sir Ceredigion County Council Compulsory Purchase Order 2013 was approved in 2013. Demolition appears to have started in early 2015 with facilities likely to be open by December 2016. At the time of writing no environmental information or assessment was located online.	No	No	Out	The construction of this project would be completed in advance of Wylfa Newydd construction. As there are no anticipated spatial or temporal links with the Wylfa Newydd Project, the project is not scoped out at this time.
PM01	Renewable Developments Wales Ltd in conjunction with The Valley Pembrokeshire Ltd	25 Megawatt (MW) wood fuelled power station at Trecwn Valley, Pembrokeshire.	Planning application approved 24th March 2015. Planning Application Ref: 14/0300/PA. Construction is likely to commence in 2015, the likely duration being 30 months. Planning documents, including the Environmental Statement, are available online - http://planning.pembrokeshire.gov.uk/ANITEIM.WEBSEARCH/Results.aspx?grdResultsPS=50&grdResultsP=2	No	Potential	Out	No spatial link is present with the Trecwn Valley power station, therefore it is scoped out at this time.
WR0	Nicklaus	Golf resort and hotel	Currently progressing through	No	Potential	Out	No spatial link is present with

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
1	Joint Venture Group	development in Wirral, Hoylake.	planning stages. An accompanying Environmental Statement is anticipated.				the Nicklaus Golf Resort, therefore it is scoped out at this time.
WR02	Peel Group	New campus for Wirral Met College at the Wirral Waters development in Birkenhead. The waterfront site is part of a 30-year plan to transform 500 acres of dockland.	Planning permission granted. Completion expected in September 2015. At the time of writing no environmental information or assessment was located online.	Potential	No	Out	The construction of the Wirral Met College campus would be completed in advance of Wylfa Newydd construction. As there are no anticipated temporal links with the Wylfa Newydd Project, the project is scoped out at this time.
WR03	Peel Group	Wirral Waters regeneration – A 30 to 50-year project. http://www.wirralwaters.co.uk/about/	A 30 to 50-year project, no proposals have been submitted to planning.	No	Potential	Out	No spatial link is present with the Wirral Water Regeneration scheme, therefore it is scoped out at this time.
LV01	Absolute Living Developments	White House, Runcorn. A project in Runcorn to convert East Lane House into 448 one-bedroom flats.	Permission granted 15 July 2015 and project is under construction. At the time of writing no environmental information or assessment was located online.	No	No	Out	As there are no anticipated spatial or temporal links with the Wylfa Newydd Project, the White House development is scoped out at this time.
LV02	Liverpool Football Club	The expansion of Liverpool Football Club's Anfield's Main Stand (Stadium) is underway.	Completion expected 2016. At the time of writing no environmental information or assessment was located online.	No	No	Out	As there are no anticipated spatial or temporal links with the Wylfa Newydd Project, the project is not included within the scope of the CIA.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		http://www.liverpoolfc.com/stadium-expansion					
RI01	Electricity Supply Board	Electricity Supply Board plans to demolish and redevelop their Fitzwilliam Street, Dublin headquarters.	Planning Approved 23/01/2015. Planning Application Reference: 3052/14. The Environmental Impact Statement is available online - http://www.dublincity.ie/swiftlg/apas/run/WPHAPPDETAIL.DisplayUrl?theApnID=3052/14 The project construction period is estimated at 33 months. The estimated start date is early 2017 and completion date is Autumn 2019.	No	Yes	Out	No spatial link is present with the Electricity Supply Board plans, therefore it is scoped out at this time.
RI02	Dublin Port Company	Alexandra Basin Redevelopment (ABR) Project. Extension of infrastructure and open up Dublin Port to larger cruise and cargo ships. The port will dredge the river Liffey to increase the depth of its berths and the entrance channel from 7m to at least 10m. This will eliminate access issues	The project is subject to final consent from the Department of Environment, Community and Local Government and from the Environmental Protection Agency. Construction work is expected to start in October 2015. The Environmental Impact Statement is available online - http://dublinportabr.ie/eis	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Alexandra Basin Redevelopment's proposed construction and operation.

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		caused by tides and enable large cruise and cargo ships to turn in Alexandra Basin and dock at East Link Bridge, rather than reversing up the Liffey to their berth as they do now.					
RI03	Dun Laoghaire Harbour Company (Ireland)	Proposed New Cruise Berth For Large Cruise Ships at Dun Laoghaire Harbour Dun Laoghaire Harbour Company is seeking permission for an €18m cruise berth facility to cater for jumbo cruise ships.	Planning application submitted. The accompanying Environmental Impact Statement was not obtained at the time of writing. The expected construction duration is 15 to 18 months. Although construction phasing is known the scheduled start date is unknown.	Yes	Yes	In	Inter-Project cumulative effects are possible as a result of the Wylfa Newydd Project's construction and operation and Dun Laoghaire Harbour's proposed construction and operation.
NU01	Horizon	Oldbury Construction, operation and decommissioning of a new nuclear power station using UK ABWR technology.	Early site investigations but no set programme for development of the site	No	Potential	Out	The development of the Oldbury site is in the very early stages and as such it is scoped out at this time.
NU02	EDF Energy	Hinkley Point C (Somerset) Construction, operation and decommissioning	Decision on the application for a development consent order for Hinkley Point C New Nuclear Power Station was taken on 19	No	Yes	In	No spatial link is present between EDF Hinkley and Wylfa Newydd, however at this time it considered that

Ref. No.	Developer	Project Title & Description	Current Status and Availability of Information	Spatial Link	Temporal Link	Scoped In or Out	Justification for Scoping Project In or Out
		of a new nuclear power station using Areva ERP technology.	March 2013 and has now been granted. Accompanying Environmental Statement is available - http://infrastructure.planninginspectorate.gov.uk/projects/south-west/hinkley-point-c-new-nuclear-power-station/?ipcsection=docs&stage=app&filter=Environmental+Statement				inclusion of planned new nuclear power stations that are at a reasonable stage in their development is appropriate.
NU03	EDF Energy	Sizewell C (Suffolk) Construction, operation and decommissioning of a new nuclear power station using Areva ERP technology.	An application for a development consent order is in preparation. Stage 1 Preliminary Environmental Information is available online - http://sizewell.edfenergyconsultation.info/wp-content/uploads/SzC-Stage-1-Environmental-Report.pdf	No	Yes	In	No spatial link is present between EDF Sizewell and Wylfa Newydd, however at this time it considered that inclusion of planned new nuclear power stations that are at a reasonable stage in their development is appropriate.
NU04	NuGen	Moorside (Cumbria) Construction, operation and decommissioning of a new nuclear power station using Westinghouse AP1000 technology.	An application for a development consent order is in preparation. Stage 1 Preliminary Environmental Information is available online - http://www.nugenconsultation.com/media/1092/stage-1-consultation-overview.pdf	No	Yes	In	No spatial link is present between EDF Hinkley and Wylfa Newydd, however at this time it considered that inclusion of planned new nuclear power stations that are at a reasonable stage in their development is appropriate.

Table 21.3: Reasonably foreseeable future projects short-list

Ref. No.	Developer	Project Title & Description
AN01	Magnox Limited	Wylfa Decommissioning Decommissioning of the Existing Power Station (Wylfa) including care and maintenance of the existing facilities followed by decommissioning and final site clearance.
AN02	Lateral Power Limited	Anglesey Eco Park Construction and operation of a wood pellet burning power plant, expected to generate 299MW of electricity.
AN04	Land and Lakes	Penrhos Leisure Village A leisure village at Penrhos Coastal Park; a leisure village at Cae Glas, Parc Cybi, (used initially as a temporary construction workers accommodation complex); and a residential development of up to 320 new houses at Kingsland (used initially to provide accommodation for construction workers).
AN05	Conygar Stena Line Ltd	Holyhead Waterfront Redevelopment A comprehensive mixed use development on 1.2km of Holyhead waterfront at Newry Beach and Porth y felin.
AN06	Conygar	Parc Cybi Stage 2 Mixed use employment developments, primarily distribution and warehousing space on the southern edge of Holyhead alongside the A55.
AN07	National Grid	North Wales Connection Project A new connection for new energy generation in North Wales. Potential new generation includes the proposed Wylfa Newydd power station as well as a number of renewable energy projects.
AN08	TPG Wind Limited (a joint venture between E.ON and Eurus Energy UK Ltd)	Rhyd-y-Groes Repower The current wind Rhyd-y-Groes Wind Farm, located near the northern shores of Anglesey in Wales, has 22 turbines with a maximum total power output of 6.6MW. Proposals are to replace the current turbines with up to 13 modern turbines, which could produce up to 11.7MW of renewable energy.
AN09	M-SParc	Menai Science Park A new science park located on the outskirts of Gaerwen. Being developed as a location for industry facing research projects, SMEs and Corporates, to drive growth in knowledge-based science in North West Wales.
AN10	Amlwch LNG	Amlwch LNG Tankers would import liquid gas to a mooring three kilometres from the Amlwch coast. The gas would then be transferred by an undersea pipeline from the mooring platform to the site near the town of Amlwch, where it would

Ref. No.	Developer	Project Title & Description
		be converted back to natural gas and sent into the UK gas network.
AN11	Minesto	Holyhead Deep 10 MW Tidal kite installation off the coast of Holyhead.
AN13	IACC	Holyhead Primary School New primary school planned to replace Ysgol y Parchedig Thomas Ellis, Ysgol y Parc and Ysgol Llaingoch schools. To be built on the former Ysgol Cybi site in Holyhead.
AN14	IACC	Llanfaethlu Primary School Plans for a new primary school to replace Ysgol Cylch y Garn, Ysgol Ffrwd Win and Ysgol Llanfachraeth.
AN15	IACC	Llangefni Link Road Scheme The IACC is proposing a new 2.5km link road around the eastern side of Llangefni to enable traffic to more freely access the industrial estate in Coleg Menai and reduce expected traffic in Llangefni town centre.
AN20	Utilities companies (various)	Removal (and in some instances replacement) of services currently in place on the Wylfa Newydd Development Area. Plans are in place to remove or replace existing services, e.g. electrical cables, which are currently installed on the Wylfa Newydd Development Area. This work is expected to be carried out by the relevant utilities companies under Permitted Development rights and funded by Horizon.
GW01	Snowdonia Pumped Hydro Limited	Glyn Rhonwy Pumped Storage Construction and operation of a 600MWh pumped storage scheme, with a generating capacity of 99.9MW, at the Glyn Rhonwy and Chwarel Fawr quarries, near Llanberis, Gwynedd.
GW02	Gwynedd Council	A487 Caernarfon to Bontnewydd Bypass A new 9.8km highway commencing at the Goat roundabout (A499/487 junction) and terminating at the Plas Menai roundabout. The new route will have 22 separate structures including seven bridges.
CN01	Conwy County Borough Council	Demolition of Colwyn Bay's Victoria Pier.
RI02	Dublin Port Company	Alexandra Basin Redevelopment (ABR) Project. Extension of infrastructure and open up Dublin Port to larger cruise and cargo ships. The port will dredge the river Liffey to increase the depth of its berths and the entrance channel from 7m to at least 10m. This will eliminate access issues caused by tides and enable large cruise and cargo ships to turn in Alexandra Basin and dock at East Link Bridge, rather than reversing up the Liffey to their berth as they do now.

Ref. No.	Developer	Project Title & Description
RI03	Dun Laoghaire Harbour Company (Ireland)	Proposed New Cruise Berth For Large Cruise Ships at Dun Laoghaire Harbour Dun Laoghaire Harbour Company is seeking permission for an €18m cruise berth facility to cater for jumbo cruise ships.
NU02	EDF Energy	Hinkley Point C (Somerset) Construction, operation and decommissioning of a new nuclear power station using Areva ERP technology.
NU03	EDF Energy	Sizewell C (Suffolk) Construction, operation and decommissioning of a new nuclear power station using Areva ERP technology.
NU04	NuGen	Moorside (Cumbria) Construction, operation and decommissioning of a new nuclear power station using Westinghouse AP1000 technology.

21.2.6 Step 6: assessment

For some environmental topics, the consideration of cumulative effects will be undertaken quantitatively (e.g. incorporation of future development scenarios into traffic modelling). However, for other topics (e.g. landscape and visual assessment) the assessment of cumulative effects is undertaken qualitatively. In those cases, professional judgement will be used to determine potential cumulative effects, using available information and published data.

Factors to be considered in assessing the significance of cumulative effects will include:

- determination of the type and sensitivity of receptors or resources potentially affected;
- development related activities which could potentially affect their condition; and
- the probability of cumulative effects occurring.

Intra-development cumulative effects will be identified within individual topic chapters of the Environmental Statement and will be summarised within the CIA chapter or appendix. The identification of intra-project cumulative effects will come from the environmental information available on each development in the Wylfa Newydd Project. Inter-project cumulative effects will be identified using professional judgement from a review of the effects associated with the Wylfa Newydd Project and the available information on projects in the RFFP short-list.

In each case the assessment process will be to take identified residual effects (post-mitigation) from the topic chapters and review those against the known information for the other Wylfa Newydd developments (intra-project) or the available information on projects in the RFFP short-list (inter-project) to identify where there is the potential for cumulative effects to occur. CIAs will largely use professional judgement to identify and assess potential cumulative impacts. The approach to the CIA will be consistent with the EIA methodology and will use the same sensitivity, magnitude and significance criteria as explained in section 7.2. Additive and combined cumulative effects will be identified.

21.2.7 Step 7: alternatives and mitigation

Where effects are identified from the assessment process Horizon will aim to identify alternatives which avoid the effect. Where this is not possible additional mitigation will be proposed to avoid or reduce cumulative effects.

Where intra-project cumulative effects are identified Horizon will work internally to identify the most appropriate mitigation across all developments. Where inter-project cumulative effects are identified Horizon will, wherever possible, work with other developers to identify appropriate mitigation and share the burden of any additional mitigation identified.

21.2.8 Step 8: reporting

A CIA will form a chapter of all Environmental Statements submitted on the Wylfa Newydd Project. Reporting of all CIAs will include details of the uncertainties and limitations of the assessment.

21.2.9 Step 9: monitoring and management

The relevant mitigation and any monitoring and management requirements associated with the cumulative effects identified will be incorporated in to the Environmental Management Plans for developments and/or the wider project.

21.3 Next steps

Within the CIA process identified in section 21.2 we are currently undertaking Step 5. As the design information relevant to the Project evolves and the environmental assessments are finalised, the CIA will be updated. This will be an iterative process whereby the CIA is updated for each environmental statement leading up to the DCO application.

Environmental baseline information will continue to be collected for both the Generating Station and the Associated Development. The baseline information used for the main EIA process will be used within the CIA. Additional information on the Associated Development sites in particular will aid the completion of the CIA and ensure there is a consistent level of information across all developments.

Environmental information will also be requested from other developers on the RFFP short-list. Information will be sought on their projects and the likely environmental effects associated with them. Where possible reliance will be placed on EIA documentation from other developers, e.g. scoping reports or environmental statements. However, several of the projects on the RFFP short-list are not expected to produce EIA documentation, in which case reliance will be placed on the environmental information that can be provided by other developers. Where this has limitations or information is lacking this will be clearly identified in the CIA.

The next steps on the CIA are focussed on taking into account feedback on this chapter of the updated EIA Scoping Report and feedback from the upcoming Stage Two pre-application consultation. Discussions with key stakeholders, council representatives and developers on the RFFP short-list will continue as the CIA progresses. In particular, we are interested to know if relevant projects have been missed from the RFFP long-list.

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23 Appendix A: Glossary of Terms and Abbreviations

Defined Term	Acronym	Definition
Above Ordnance Datum	AOD	Above the mean sea level at Newlyn in Cornwall calculated between 1915 and 1921, taken as a reference point for the height data on ordnance survey maps.
Advanced Boiling Water Reactor	ABWR	A third generation evolution of the Boiling Water Reactor design.
Air Quality Objective	AQO	The concentration of a pollutant, over a specified period, above which adverse effects on health and / or the environment could potentially occur and which should not be exceeded, or may be exceeded a permitted number of times over a specified period. The Air Quality Objectives are specified in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007.
Alternate Emergency Control Centre	AECC	A facility that is physically separate from but local to the Power Station and part of the Generating Station. This facility would provide back-up command and communications facilities that would be used to remotely manage an incident at the Power Station Site in the extremely unlikely event that the primary facilities on the Power Station Site were unavailable
Annual Average Daily Traffic	AADT	Traffic flow estimate that gives the number of vehicles that will drive on that stretch of road on an average day of the year.
Annual Average Daily Traffic	AAWT	Traffic flow estimate that gives the number of vehicles that will drive on that stretch of road on an average weekday of the year.
Annual Exceedance Probability	AEP	The likelihood or probability that an event will occur in any one year. The surface water modelling has been completed for a 0.1% Annual Exceedance Probability (AEP) storm event, i.e. an event that will occur once in 1000 years.
Appraisal of Sustainability	AoS	Assessment to examine the likely social, economic and environmental effects of designating policy or plans.
Appropriate Assessment	-	An assessment in accordance with the stage 2 of the Habitats Regulations Assessment process to determine whether a plan or project will have a potential effect on the integrity of a Natura (European designated) site.

Defined Term	Acronym	Definition
Area of Outstanding Natural Beauty	AONB	Areas designated under the Countryside and Rights of Way Act 2000 for the purpose of conserving and enhancing the natural beauty of the designated area.
Article 37		Article 37 of the EURATOM Treaty Every time a Member State alters the way in which it plans to dispose of Radioactive Waste or promotes a new Nuclear Power Station which may increase emissions, it must make an Article 37 submission to the European Commission. This must provide enough data to make it possible for the European Commission to determine whether the "implementation of such plans is liable to result in the radioactive contamination of the water, soil or airspace of another Member State."
Associated Development		Development to support the delivery of the Generating Station, for example highway improvements along the A5025, Park and Ride facilities for construction workers, Off-site Stores, Logistics Centre, Temporary Workers' Accommodation and Horizon's Visitor Centre.
Benefit		The quantifiable or measureable improvement resulting from the completion of Project deliverables that is perceived as positive by a Stakeholder.
Best Available Techniques	BAT	The legislative requirements whereby Operators must demonstrate that certain operations are conducted in the optimum manner, to prevent or minimise releases and limit the impact on the environment, taking a number of factors into account including technological advances, economic feasibility and time.
Birds Directive	-	The European Union’s Directive on the conservation of wild birds (Directive 2009/147/EC of 30 November 2009).
Birds of Conservation Concern	BoCC	A register containing the population status of birds regularly found in the UK, Channel Islands and the Isle of Man, according to their level of conservation concern.
Boiling Water Reactor	BWR	A reactor design where water (used both as Coolant and moderator) is allowed to boil in the core. The resulting steam is used to drive a turbine and electrical generator, thereby generating electricity.

Defined Term	Acronym	Definition
Cadw	-	Statutory body charged with protecting the historic and built environment of Wales (part of Welsh Government).
Cofnod – North Wales Environmental Information Service	-	One of four local record centres in Wales which support the observation and recording of wildlife.
Commissioning		A series of tests conducted on the structures, systems and components of the Generating Station.
Competent Authority	-	For the purposes of Habitats Regulations Assessments, the competent authority is the body responsible for carrying out the HRA to determine whether there are any potential effects on Natura 2000 sites. They are also required to consult with the relevant nature conservation bodies (and the public, if considered appropriate). For the purposes of application for a Development Consent Order, the competent authority is the body that authorises the Nationally Significant Infrastructure Project – the SoS.
Condenser (TBC)		A large heat exchanger designed to cool low-pressure (normally sub-atmospheric) exhaust steam from a turbine to slightly below the saturation temperature, so that it can be returned to the heat source as Feedwater.
Conservation Area	-	An area designated under section 69 of the Planning (Listed Building and Conservation Areas) Act 1990 as being an area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.
Construction Compounds		Enclosed areas situated adjacent to the Power Station Site, Off-Site Power Station Facilities and Associated Development sites, as the focus for fabrication, laydown, site offices, parking, welfare, concrete batching, plant and other facilities needed for the construction of the Wylfa Newydd Project.
Construction Environmental Management Plan	CEMP	The plan to be produced to establish environmental management protocols for the construction activities of the Project.
Construction Site		Land within a defined boundary on which construction-related activities take place.
Contamination		Radioactive material that is deposited on the

Defined Term	Acronym	Definition
(radioactive)		surface of, or incorporated within, materials, structures, areas, objects or people where its presence is unintended or undesirable.
Cooling Water	CW	The water used to remove heat from the Generating Unit.
Cooling Water System	CWS	The once-through system that removes, using Cooling Water, the proportion of heat energy produced by the Nuclear Reactors which cannot be converted into electricity, and for this Project includes the intakes, pumphouses, breakwaters, seal pits and outfall structures as well as connecting pipelines and tunnels, for each Generating Unit.
Copper Trail	-	The northern section of national route 566, forming part of the Sustrans national cycle network.
Core		The central portion of a Nuclear Reactor, which contains the Fuel Assemblies, moderator, neutron poisons, Control Rods, and support structures. The Core is where Fission takes place.
Countryside Council for Wales	CCW	Formerly the Welsh Government's statutory advisor on sustaining natural beauty, wildlife and the opportunity for outdoor enjoyment in Wales and its inshore waters. As of April 2013, its functions passed to Natural Resources Wales.
Cumulative Impacts Assessment	CIA	An assessment to identify the potential significant effects caused by the interactions of effects from different aspects of a project, and between different projects.
Daily Commuting Zone	DCZ	The boundary for assuming reasonable daily commuting behaviour to the Power Station Site during the construction and operational phases of the Generating Station.
Decommissioning and Clean Up		The transition of the Power Station Site to a de-licensed state so that it is no longer a Nuclear Licensed Site and such that the land becomes available for alternative uses. Once a nuclear site reaches the end of its operational life, it needs to be decommissioned and cleaned up. This involves the progressive reduction of hazards on site in order to allow further development to take place, or release the site from regulatory control.
Department for Communities and Local	DCLG	The UK government department responsible for (among other things) developing planning

Defined Term	Acronym	Definition
Government		policy and planning legislation.
Department for Environment, Food and Rural Affairs	Defra	The UK government department responsible for policy and regulations on the environment, food and rural affairs.
Department for Transport	DfT	The UK government department with responsibility for transport issues.
Department of Energy and Climate Change	DECC	The UK government department with responsibility for (among other things) energy and climate change issues, including the security of the UK's energy supplies.
Design Manual for Roads and Bridges	DMRB	A set of 15 volumes of documents prepared by the Highways Agency that provide a comprehensive manual system that accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads (including motorways).
Designated Freight Route	-	The A55 (on Anglesey), the A5 and the A5025 from Valley to the Wylfa Newydd Development Area, as shown in figure 10.1 of the Stage One Consultation Document.
Development Consent Order	DCO	The consent for a Nationally Significant Infrastructure Project required under the Planning Act 2008.
Development Plan		A hierarchy of planning documents that together form the Local Planning Authority's policies for the development and use of land and buildings in its area.
Disposal		The placement of waste in a suitable facility without the intention to retrieve it at a later date.
District Survey Laboratory	DSL	
Dwr Cymru Welsh Water	DCWW	Dwr Cymru Welsh Water supplies water, sewerage and trade effluent services to homes, offices and businesses in Wales and parts of England.
Earthworks	EW	Those activities involving the excavation and deposition of bulk rock and earth at the Power Station Site to make way for the construction of the Generating Station.
Ecological Status	-	The overall ecological status assessed by a number of different quality elements (biological, physico-chemical and hydromorphological) that represent indicators of the overall quality of the water body.

Defined Term	Acronym	Definition
Effect		The result of an event in terms of the objectives (e.g. for an activity, Project or organisation).
Emergency Control Centre (TBC)	ECC	The primary facility, on the Power Station Site, that provides the primary location for managing the site response to an incident.
EN-1 - Overarching National Policy Statement for Energy	NPS EN-1	The National Policy Statement designated by the SoS in July 2011, which sets out the overarching national policy for delivery of major energy infrastructure projects.
EN-6 - National Policy Statement for Nuclear Power Generation	NPS EN-6	The National Policy Statement designated by the SoS in July 2011 which sets out national policy on new Nuclear Power Stations and against which an application for a Development Consent Order for a Nuclear Power Station is assessed.
Enabling Works	-	The works required to remove and clear parts of the Wylfa Newydd Development Area of vegetation, top soil, existing services, utilities and other features and structures, in order to prepare for the Earthworks and Main Construction stage activities to commence. This work would also include the installation of any new services or utilities required to support the Main Construction stage activities.
Environment Agency	EA	The executive non-departmental public body with responsibility for environmental regulation in England. The Environment Agency gives advice to Natural Resources Wales in relation to the radioactive substances regulation under the Environmental Permitting (England and Wales) Regulations 2010 and to the Welsh Government in respect of Generic Design Assessment for the UK ABWR.
Environmental Impact Assessment	EIA	The process in which the likely significant effects of a development on the environment are identified and assessed.
Environmental Management Plan	EMP	A document that sets out the key environmental and planning / consenting considerations that must be taken into account for any works taking place. There will be more than one plan and the development of these plans is an iterative process.
Environmental Management System	EMS	A structured framework for managing an organisation's environmental impacts.
Environmental Permit		A permit that is required to operate a regulated activity under the Environmental Permitting

Defined Term	Acronym	Definition
		(England and Wales) Regulations 2010.
Environmental Protection UK	EPUK	UK association of environmental protection specialists. Works on environmental protection and management issues including air quality and noise.
Environmental Quality Standards	EQS	Directive 2008 / 105 / EC sets out environmental quality standards concerning the presence in surface water of certain pollutants and substances or groups of substances identified as priority or "priority hazardous", on account of the substantial risk they pose to or via the aquatic environment. Priority substances are defined by Directive 2000 / 60 / EC (the Water Framework Directive).
Environmental Statement	ES	The document in which the results of an Environmental Impact Assessment are presented.
Environmental Survey Laboratory	ESL	A facility that is physically separate from but local to and part of the Generating Station. It would provide facilities to manage radiological survey in the local area, including radiation monitoring equipment controls.
EURATOM Treaty (TBC)		The Treaty establishing the European Atomic Energy Community, signed on 25 March 1957.
European Designated Sites		The following sites which are designated and therefore given special protection under the Habitats Directive and the Birds Directive: • Special Areas of Conservation (SACs). • Special Protection Areas (SPAs). • Sites of Community Importance (SCIs) (which is the second step in formal designation as a SAC). • candidate SACs(which is the first step in formal designation as a SAC). • potential SPAs (which are approved by the government but not yet classified as SPAs). Collectively, the above European Designated Sites are known as Natura 2000. There are also internationally important and designated wetland sites which often overlap with the European Designated Sites listed. These wetlands are known as Ramsar Sites (identified under the Ramsar Convention, 1971).
European Protected Species	EPS	Animals and plants protected under The Conservation of Habitats and Species

Defined Term	Acronym	Definition
		Regulations 2010.
European Protected Species Licence/Licensing	EPSL	The licence issued to permit an activity affecting European Protected Species which would otherwise be an offence under the Conservation of Habitats and Species Regulations 2010
Existing Power Station	EPS	The existing Magnox Power Station at Wylfa.
Fission (TBC)		The splitting of an atomic nucleus into approximately equal parts, either spontaneously or as a result of the impact of a particle, usually with an associated release of energy.
Flood Consequence Assessment	FCA	An assessment of the risk of flooding in any given area, usually associated with a particular development. Consideration is given to the potential for the development to increase the risk of flooding and particular attention is given to areas already identified as being at risk from flooding. Flood Consequence Assessments may assess the risk of flooding from fluvial sources, groundwater, surface water runoff and sewer water.
Generating Station		The proposed new Nuclear Power Station, including two UK ABWRs, associated plant and Ancillary Structures and features, to be constructed and operated at Wylfa, Anglesey.
Generating Unit		All plant and systems, nuclear and non-nuclear associated with a single Nuclear Reactor and connected steam turbine generator.
Generic Design Assessment	GDA	The process being used by the Office for Nuclear Regulation and the Environment Agency to assess the safety, security and environmental implications of new Nuclear Reactor designs for the UK, separately from applications to build them at a specific site.
Geological Disposal Facility	GDF	A highly-engineered facility capable of isolating radioactive waste within multiple protective barriers, deep underground, to ensure that no harmful quantities of radioactivity ever reach the surface environment.
GeoPark	-	A territory which includes a particular geological heritage and a sustainable territorial development strategy.
Good Ecological Status		Water Framework Directive term denoting a slight deviation from "reference conditions" in a

Defined Term	Acronym	Definition
		water body, or the biological, chemical and physico-chemical and hydromorphological conditions associated with little or no human pressure.
Gwynedd Archaeological Planning Service	GAPS	An autonomous section of the Gwynedd Archaeological Trust that provides specialist impartial archaeological advice to the Local Planning Authorities of North West Wales, and to national agencies, utilities companies, developers, consultants and others engaged in development in the public and private sectors.
Habitats Directive		The European Union's Directive on the conservation of wildlife, plants and habitats (Directive 92/43/EEC of 21 May 1992).
Habitats Regulations Assessment	HRA	The process by which plans and projects are assessed for their likely significant effects on European Designated Sites, pursuant to the Habitats Directive and the Conservation of Habitats and Species Regulations 2010.
Hazardous Waste		Waste is generally considered hazardous if it (or the material or substances it contains) are harmful to humans or the environment.
Health & Safety Executive	HSE	A statutory body whose role is the enforcement of work-related health and safety law.
Health Impact Assessment	HIA	The process by which the Wylfa Newydd Project will be assessed to determine its health effects on a population, particularly vulnerable or disadvantaged groups. It will make recommendations seeking to minimise negative health effects as well as identifying opportunities to maximise positive health effects.
Health Impact Assessment Scoping Report		The scoping report for the Health Impact Assessment for the Wylfa Newydd Project.
Heavy Equipment		Motorised equipment typically used in industry for moving or hauling heavy items or material.
Historic Environment Record	-	Detailed record on archaeological assets in Wales, including protected monuments, structures, landscapes and marine sites, which provide information to members of the public, statutory bodies and developers about the archaeological resource.
Historic Landscape Type	HLT	
Historic Parks and Gardens		Historic Parks and Gardens in Wales are those sites thought to be of national importance and

Defined Term	Acronym	Definition
		which have been included in the Register of Parks and Gardens of Special Historic Interest in Wales by Cadw/ICOMOS (International Council of Monuments and Sites UK).
Hitachi, Ltd.	Hitachi	Please speak to a member of the legal team if you are unsure which company should be referred to.
Horizon Nuclear Power	Horizon	Please speak to a member of the legal team if you are unsure which company should be referred to.
Horizon Nuclear Power Wylfa Limited		Please speak to a member of the legal team if you are unsure which company should be referred to.
Infrastructure EIA Regulations	-	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.
Infrastructure Planning Commission	IPC	The Infrastructure Planning Commission was a non-departmental public body responsible for the examining and in certain circumstances the decision making body for proposed nationally significant infrastructure projects. The Commission was abolished in 2012 with responsibility being passed to the Planning Inspectorate.
Institute of Air Quality Management	-	The professional body for air quality practitioners.
Integrated Traffic and Transport Strategy	ITTS	The strategy to be developed by Horizon to present a holistic approach for the delivery of sustainable transport and access solutions to and between the key development sites that together form the Wylfa Newydd Project, including to ensure efficiency, manage environmental impacts, ensure safety and present transport solutions.
Intermediate Level Waste	ILW	Waste that has a radioactive content exceeding the LLW limit but that does not have a significant heat output.
International Association of Impact Assessments	IAIA	IAIA is a forum for improving and promoting best practice in environmental impact assessment around the world
Isle of Anglesey County Council	IACC	The local authority governing the area within which the Wylfa Newydd Generating Station is intended to be constructed. IACC has a number of functions, including the granting of planning permission as local planning authority.
Joint Local Development Plan	JLDP	Planning document being jointly produced by the Isle of Anglesey County Council and

Defined Term	Acronym	Definition
		Gwynedd Council that will set out the land use planning policy framework for those areas up to 2026.
Joint Nature Conservation Committee	JNCC	The public body that advises the UK government and Welsh Government on UK-wide and international nature conservation.
Landscape Character Areas	LCAs	Single, unique areas which are the discrete geographical areas of a particular landscape type.
Landscape and Environmental Masterplan	LEMP	A fully coordinated environmental landscape design covering the Wylfa Newydd Development Area, including the formation of mounds, habitat and woodland creation, targeted biodiversity mitigation and enhancement measures, temporary and permanent public footpath diversions, management of watercourses and surface water drainage and other relevant environmental considerations.
Language Impact Assessment Scoping Report		A scoping report to review the Language Impact Assessment for the Wylfa Newydd Project.
Listed Building		A building or structure designated under the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of 'special architectural or historic interest'.
Local Air Quality Management	LAQM	A process that requires Local Authorities across the UK to review, assess and manage the air quality within their geographical areas.
Local Impact Report	LIR	A written report prepared by the relevant Local Planning Authority giving details of the likely impact of a proposed Nationally Significant Infrastructure Project development on the Local Planning Authority's area under the Planning Act 2008.
Local Planning Authority	LPA	The local authority or council that is empowered by law to exercise planning functions over a particular area (including the granting of planning permissions).
Logistics Centre		An Off-Site facility at which deliveries can be consolidated into fewer loads and the timing of traffic movements to the Wylfa Newydd Development Area can be controlled during both the Enabling Works and Main Construction stages.
Low Level Waste	LLW	Waste that has a radioactive content not

Defined Term	Acronym	Definition
		exceeding 4 GBq (gigaBecquerels) per tonne of alpha, or 12 GBq per tonne of beta / gamma activity.
Main Construction	-	Construction activities within the Wylfa Newydd Development Area that would result in the completion of the Power Station, including final levelling and deep excavations for the Power Station foundations, civil construction activities, commissioning of both Generating Units and site finishing.
Marine Licence	-	The licence required to undertake works in the marine environment under the Marine and Coastal Access Act 2009.
Marine Off-Loading Facility	MOLF	A facility comprising purpose built quays to allow delivery of freight such as Abnormal Indivisible Loads and construction materials by sea.
Megawatt	MW	Unit of measurement of power, equal to one million watts.
Mobile Emergency Equipment Garage	MEEG	Building to be provided in an off-site location for the storage of specialist emergency vehicles and equipment that may be required in the event of a critical incident at the Power Station Site.
Moderate Ecological Status		Water Framework Directive term denoting a moderate deviation from the "reference condition" in a water body, for biological, chemical and morphological elements.
National Grid	NGET / NG	National Grid Electricity Transmission Plc.
National Policy Statements	NPS	Statements prepared and designated by the SoS under the Planning Act 2008, which establish national policy for Nationally Significant Infrastructure Projects, including energy, transport and water, waste water and waste and against which applications for Development Consent Orders are assessed.
Nationally Significant Infrastructure Project	NSIP	A type of project listed in the Planning Act 2008, and which must be consented by a Development Consent Order. The construction of a generating station is a Nationally Significant Infrastructure Project.
Natura 2000		See European Designated Sites.
Natural Environment and Rural Communities Act 2006	NERC	UK legislation which requires the Welsh Government to publish, review, revise, and act on a list of habitats and species of principal importance in Wales. This list is known as the

Defined Term	Acronym	Definition
		Section 42 List of species and habitats that are of principal importance for the conservation of biodiversity in Wales.
Natural Resources Wales	NRW	The public body whose stated purpose is to ensure that the natural resources of Wales are sustainably maintained, enhanced and used, now and in the future. It absorbed the regulatory and advisory duties of the Environment Agency Wales, Countryside Council for Wales and the Forestry Commission in Wales.
New Nuclear Build at Wylfa: Supplementary Planning Guidance	Wylfa SPG	IACC's supplementary planning guidance, in respect of the new Nuclear Power Station at Wylfa, Anglesey, published in July 2014.
North Wales Wildlife Trust	NWWT	The registered charity which aims to conserve wildlife and increase understanding of wildlife in North Wales.
Nuclear Decommissioning Authority	NDA	The non-departmental public body created through the Energy Act 2004 responsible for Decommissioning and Clean-Up of nuclear facilities in the UK, and providing for the disposal of all the resulting wastes.
Nuclear Energy		The energy that is released through Fission or by Radioactive Decay.
Nuclear Fuel (TBC)		Fissionable nuclear material in the form of fabricated elements for loading into the Core of a Nuclear Power Station.
Nuclear Island	NI	Each Nuclear Reactor and its associated plant and structures, which form part of the Power Station.
Nuclear Licensed Site	-	A site in respect of which a Nuclear Site Licence has been granted.
Nuclear Power Station		An electrical generating facility using a Nuclear Reactor as its heat source to provide steam to a steam turbine generator.
Nuclear Safety Case	-	A set of documents that describe the radiological hazards in terms of a facility and modes of operation (including potential undesired modes) and the measures that prevent or mitigate against harm being incurred and which should provide a coherent demonstration that relevant standards have been met and that risks are ALARP.
Nuclear Site Licence		The licence required under the Nuclear Installations Act 1965 for the installation and

Defined Term	Acronym	Definition
		operation of a Nuclear Reactor granted by the Office for Nuclear Regulation.
Office for National Statistics	ONS	The ONS is the recognised national statistical institute for the UK. It is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels. It also conducts the census in England and Wales every ten years.
Office for Nuclear Regulation	ONR	The public corporation, which is responsible for (among other things) the regulation of nuclear safety and nuclear security at Nuclear Licensed Sites in the UK.
Off-line Highway Improvements	-	Highway improvements that involve the construction of new sections of road.
Off-Site		Areas of land needed for the Wylfa Newydd Project, which are yet to be identified, but would be outside the Wylfa Newydd Development Area.
Off-Site Power Station Facilities	-	The emergency and other facilities that would be physically separate from the Power Station Site and would complement the facilities within the Power Station Site, including an Alternate Emergency Control Centre, Environmental Survey Laboratory and specialist vehicle storage.
On-line Highway Improvements	-	Highway improvements that are made to the existing road, generally within the existing highway corridor.
Park and Ride Facilities	-	An Off-Site facility from which construction workers will park and travel via a dedicated bus service to the Wylfa Newydd Development Area.
Permanent Staff		[Definition to be provided at a later date]
Plan		A plan that is an intended course of future action.
Planning Act 2008		The UK legislation which, among other things, establishes a consenting regime for Nationally Significant Infrastructure Projects.
Planning Inspectorate	PINS	The body that accepts and examines applications for DCOs and makes recommendations to the SoS in support of determining whether to grant consent.
Planning Policy Wales	PPW	Guidance prepared by the Welsh Government setting out the current land use planning policy for Wales, to be taken into account by Local

Defined Term	Acronym	Definition
		Planning Authorities when preparing Development Plans.
Power Station		The proposed new Nuclear Power Station, including two UK ABWRs, associated plant and Ancillary Structures and features, to be constructed and operated at Wylfa on Anglesey. In the context of this document Generating Station and Power Station mean the same thing.
Power Station Access Road		The proposed access road from the A5025 south of Tregele to the Power Station Site.
Power Station Site		The indicative area of land and sea within which the majority of the permanent Power Station buildings, plant and structures would be situated.
Pre-Application Consultation - Stage One Consultation Document		The Wylfa Newydd Project Pre-Application Consultation - Stage One Consultation Document.
Pre-Application Consultation - Stage One Consultation Overview Document		The Wylfa Newydd Project Pre-Application Consultation - Stage One Consultation Overview Document.
Pre-Application Consultation - Stage One PEIR		The Wylfa Newydd Project Pre-Application Consultation - Stage One Preliminary Environmental Information Report.
Pre-Application Consultation - Stage One PEIR Non-Technical Summary		A non-technical summary of the Wylfa Newydd Project Pre-Application Consultation - Stage One Preliminary Environmental Information Report.
Pre-Application Consultation Stage One	PAC 1	The consultation documents published by Horizon on 29 September 2014 which were open for public comment until 8 December 2014.
Pre-Application Consultation Stage Two	PAC 2	The consultation documents to be published by Horizon in the future.
Preliminary Environmental Information Report	PEIR	
Project (or the Wylfa Newydd Project)		The Generating Station and Associated Development.
Proposed Activities	-	The activities that Horizon intends to undertake within the Wylfa Newydd Development Area during construction and operation, and the resulting built developments.

Defined Term	Acronym	Definition
Public Rights of Way	PRoW	Highways such as footpaths, cycleways and national trails that allow the public a legal right of passage.
Radioactive Waste		Any material, whatever its physical form, that is either radioactive itself or is contaminated by Radioactivity, for which no further use is envisaged by its owner.
Radioactive Waste Building	-	Building to collect and treat Radioactivity-contaminated water from the Nuclear Reactor building and turbine building.
Radioactive Waste Management		The control of Radioactive Waste from creation to disposal.
Radioactivity		The phenomenon whereby atoms undergo spontaneous random disintegration, usually accompanied by the emission of Radiation.
Reasonably Foreseeable Future Projects	RFFP	
Register of Parks and Gardens of Special Historic Interest in Wales	Historic Parks and Gardens	Historic parks and gardens in Wales are those sites thought to be of national importance and which have been included in this register by Cadw/ICOMOS (International Council of Monuments and Sites UK).
Remediation		Undertaking measures to mitigate the negative consequences of significant ground, groundwater, surface water or marine Contamination.
Risk		The effect of uncertainty on the achievement of objectives.
River Basin Management Plan		A plan that must be produced for each river basin district within a Member State in accordance with Article 13 of the Water Framework Directive.
Scheduled Monuments		Scheduled Monuments are designated under the Ancient Monuments and Archaeological Areas Act 1979 and are, by definition, of national importance.
Scoping Opinion		An opinion provided by the competent authority in accordance with the Environmental Impact Regulations that indicates the issues an Environmental Impact Assessment of a project should consider.
Scoping Report		The document which sets out the scope of an Environmental Impact Assessment.
Secretary of State (for	SoS	The cabinet minister in charge of DECC and

Defined Term	Acronym	Definition
Energy and Climate Change)		who (among other things) ultimately determines applications for Development Consent Orders.
Shoreline Management Plan	SMP	A large scale assessment of the risks associated with coastal processes.
Sites of Special Scientific Interest	SSSI	Sites designated as being of special interest for their flora, fauna or geological or physiographical features and protected under the Wildlife and Countryside Act 1981. *[Amendment made to PAC term, adding in "and protected"]*
Siting		The process of selecting a suitable site for a facility, including Appropriate Assessment and definition of the related design bases.
Special Area of Conservation	SAC	Areas that have been identified as being important for a range of vulnerable habitats, plant and animal species within the European Union and are designated under the Habitats Directive.
Special Landscape Area		A non-statutory designation applied by the Local Planning Authority to define areas of high landscape importance within its administrative boundary.
Special Protection Areas	SPA	Sites designated under the Birds Directive due to their international importance for the breeding, feeding, wintering, or the migration of, rare and vulnerable species of birds.
Spent Fuel		Fuel that has been used in a Nuclear Reactor.
Spent Fuel Storage Building	-	A building for the on-site storage of Spent Fuel prior to disposal in the Geological Disposal Facility.
Stakeholder		Any individual, group or organisation that can affect, be affected by, or perceives itself to be affected a programme/project.
Statement of Community Consultation	SOCC	A statement in which a developer sets out how it intends to consult the local community in respect of its proposed Nationally Significant Infrastructure Project pursuant to section 47 of the Planning Act 2008.
Strategic Siting Assessment	SSA	The process which was used during the preparation of NPS EN-6 to identify and assess sites which are considered strategically suitable for the deployment of new Nuclear Power Stations by the end of 2025.
Strategic Environmental	SEA	

Defined Term	Acronym	Definition
Assessment		
Sustainability Assessment Scoping Report		The Wylfa Newydd Project Sustainability Assessment Scoping Report.
Technical Advice Note	TAN	Technical Advice Notes provide specific topic-based material to support land use planning policy that is set out in Planning Policy Wales, which is the document that must be used by local planning authorities in Wales for the effective preparation of their local planning policy documents.
Temporary Workers' Accommodation	-	The specially provided type of new housing stock for construction workers, which would comprise campus style development of a minimum of 500 modular single worker en suite accommodation units, arranged in blocks that would each be served by a number of communal rooms such as a kitchen, dining area and sitting room. The modular units would be designed for temporary occupation, to be dismantled and removed after use.
Town and Country Planning Act 1990	TCPA	The Act that forms part of the land use planning regime in the UK and (among other things) establishes the legal framework in respect of applications for, and determination of, planning permissions.
Travel to Work Area	-	The boundary for assuming reasonable daily commuting behaviour to the Power Station Site. This is defined by the two travel to work areas of Holyhead; and Bangor, Caernarfon and Llangefni, as defined by the Office for National Statistics and set out in Chapter 7 (socio-economics) of the Stage One PEIR. This area is deemed to be suitable for daily commuting during the construction and operation of the Power Station.
UK Advanced Boiling Water Reactor	UK ABWR	The UK ABWR to be supplied by Hitachi-GE Nuclear Energy, Ltd., as part of the Power Station.
UK Civil Aviation Authority	(UKCAA)	The Civil Aviation Authority is the UK's specialist aviation regulator.
UK Marine Policy Statement		The document which establishes a framework for preparing marine plans and taking decisions affecting the marine environment, prepared under section 44 of the Marine and Coastal Access Act 2009.
Wales Coast Path	-	A 870 mile network of public footpaths and

Defined Term	Acronym	Definition
		other routes around the coastline of Wales, which incorporates the Isle of Anglesey Coastal Footpath.
Water Framework Directive	WFD	Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.
Welsh Government		The devolved government for Wales.
Welsh Language Impact Assessment	WLIA	The systematic, criteria-based assessment of the likely impacts of a development or project on Welsh language and culture.
Wylfa Newydd		The name of the Wylfa Newydd Project.
Wylfa Newydd Development Area	-	The indicative area of land including the Power Station Site and the surrounding areas that would be used for the construction and operation of the Power Station.
Wylfa Newydd Project or Project	-	The Generating Station and Associated Development.
Wylfa NPS Site		The Wylfa site designated by NPS EN-6 as potentially suitable for the deployment of a new Nuclear Power Station.
Wylfa SPG		See New Nuclear Build at Wylfa: Supplementary Planning Guidance.
Zone of Theoretical Visibility	ZTV	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

24 Appendix B: Assessment of suitability of the Wylfa NPS Site against the SSA criteria

Table B.1: UK Government's Assessment of Suitability against SSA Criteria

SSA Criteria	Summary of Suitability Against SSA Criteria – Wylfa
Demographics	The site does not exceed the semi-urban criterion. Although some responses noted that the area around Wylfa is sparsely populated, others were concerned about the ability to institute an effective emergency plan to evacuate the required area. For the purposes of the SSA the Government does not in general believe it is possible to determine, at a national level, the suitability of a site to meet emergency planning obligations.
Proximity to military activities	The site does not occupy any Ministry of Defence (MoD) statutory safeguarding zones protecting aerodromes, explosive storage sites, technical sites or ranges and it is not within 1000m of any MoD Danger Areas. The site is not in proximity to any MoD assets or activities that would suggest that it should be ruled out. The MoD has confirmed that any likely power station development within the site can be protected against the risk of external hazards created by neighbouring military activities throughout its lifetime; and The development of a new nuclear power station at the site would not affect the capabilities of the armed forces to carry out essential training and operations throughout its lifetime.
Flooding	There is low risk of flooding at the site. The Environment Agency and Appraisal of Sustainability has advised that it is reasonable to conclude that any new nuclear power station on the site could be protected against flood risk throughout its lifetime, including the potential effects of climate change, storm surge and tsunami, taking into account possible countermeasures.
Coastal Processes	The risks from coastal flooding, sea level rise and erosion are considered to be low. It is reasonable to conclude that the site could be protected against coastal erosion, including the effects of climate change, for the lifetime of the site.
Proximity to hazardous industrial facilities and operations	The Office for Nuclear Regulation has advised that it reasonable to conclude that any likely power station development within the site can be protected against risk arising from proximity to hazardous facilities throughout its lifetime, taking into account possible countermeasures.

SSA Criteria	Summary of Suitability Against SSA Criteria – Wylfa
Proximity to civil aircraft movements	The Civil Aviation Authority has advised that it is potentially reasonable to conclude that any likely power station development within the site can be protected against risks from civil aircraft movement and that the effects on air traffic and aerodromes can be potentially mitigated. The Office for Nuclear Regulation agreed with this advice. Nuclear power stations in the UK receive some protection from aviation activity through the establishment of a Restricted Area at each individual station.
Internationally designated sites of ecological importance	The Appraisal of Sustainability has identified that the potential for adverse effects on sites and species considered to be of European nature conservation importance means that significant strategic effects on biodiversity cannot be ruled out at this stage of the appraisal. The Government concluded that there is an Imperative Reason of Overriding Public Interest that favours the inclusion of this site in the draft Nuclear NPS despite the inability to rule out adverse effects on European Sites at this stage. This takes into account the need for sites to be available for potential deployment by the end of 2025, the lack of alternatives, and the consideration given to compensatory measures.
Nationally designated sites of ecological importance	The Government notes that the Appraisal of Sustainability has identified potential impacts on nationally designated sites of ecological importance which it considers of strategic significance. Given the scope for mitigation of biodiversity effects identified in the Appraisal of Sustainability for sites of national importance it is reasonable to conclude that it may be possible to avoid or mitigate impacts to an extent. The Appraisal of Sustainability has, however, highlighted that the proximity of Tre'r Gof SSSI (within the site) means that it is possible that there could be direct or indirect effects at this site. Given the need to ensure sufficient sites are available for development to meet the Government's energy policy objectives and the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify not including the site in this NPS.
Areas of amenity, cultural heritage and landscape value	Whilst the new Power Station will be seen within the context of the Existing Power Station (before decommissioning), given the likely scale of the development and the fact that a small part of the AONB is included in the nominated boundary, the Appraisal of Sustainability finds that there are likely to be some long lasting adverse direct and indirect effects on landscape character and visual impacts on the AONB. The Government recognises that whilst there is some potential for partial minimisation and mitigation of the effects, there could be remaining effects on the AONB. Given the need to ensure sufficient sites are available for development to meet the Government's energy

SSA Criteria	Summary of Suitability Against SSA Criteria – Wylfa
	policy objectives and the limited number of potentially suitable sites, the Government does not think the issues in relation to this criterion are sufficient to justify (against this criterion) not including the site in the NPS. The Government also notes that there may be some visual impacts on the setting of other cultural heritage features in the area. Impact and mitigation measures will need to be considered.
Size of site to accommodate operation	There is enough land within the site to safely and securely operate at least one new nuclear power station, including the safe and secure storage of all the spent fuel and intermediate level waste produced through operation, and from decommissioning, on the site of the station until it can be sent for disposal in a geological disposal facility. Mitigating actions such as siting elements of a station away from public footpaths, or realignments, to meet the requirements of a nuclear site licence should be considered. Given the size of the site it is reasonable to conclude that there is the potential to mitigate these concerns.
Access to suitable sources of cooling	It is considered reasonable to conclude that there is access to suitable sources of cooling water at the site.

25 Appendix C: Horizon's responses to 2009 Scoping Opinion

General Comments		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
3.5	Effects on human health and wellbeing, as well as potential effects on local demographics to be considered.	An HIA report will be submitted with the DCO application. Effects on local demographics will be considered as part of the socio-economics assessment. An initial review of socio-economic impacts is included in Chapter 18 of this report
3.8	Emphasis to be put on the relationship between EIA topic areas.	Noted.
3.11 – 3.13	Study areas to be clearly defined for each topic area, be sufficiently robust and agreed with relevant statutory consultees and local authorities (providing a reasoned justification where this is not possible).	Noted. Preliminary study areas are defined within each EIA topic area of this report. All study areas will be defined through consultation with stakeholders.
3.14	Consideration to be given to likely significant effects on the environment of another Member State within the European Economic Area, especially in relation to discharges to the air and sea and potential impacts on migratory species and to the Irish Sea.	Transboundary impacts will be taken into account in the EIA and HRA and especially in relation to radioactive discharges as part of the radiological impact assessment.
3.15 – 3.16	Consideration to be given to all phases of use and agreed with relevant consultees.	The ES will set out the temporal scope for each topic area and will be discussed with the relevant stakeholders. The ES will include information regarding potential impacts of decommissioning where these can be predicted with a level of confidence.
3.17	Baseline to be chosen carefully and considered in terms of the sensitivity and capacity of the receiving environment.	Noted. This report sets out details of baseline data obtained to date, including the identification of sensitive receptors.

General Comments		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
		Further baseline data will be obtained as the assessments progress and will be reported in the ES.
3.19 – 3.20	Consideration to be given to changing conditions of baseline (since survey work undertaken and in terms of the decommissioning of the Existing Power Station).	Baseline data will be robust and valid for the purposes of assessment taking into account the timescales of application. The baseline conditions described in this report will be updated as appropriate prior to the submission of the DCO application. In addition, decommissioning of the Existing Power Station will be assessed as part of the cumulative impacts assessment.
3.27 – 3.29	Combined impacts of the Project as a whole to be assessed.	Noted
3.31 – 3.33	Cumulative effects to be assessed and other major development in the areas to be identified in consultation with the LPAs.	Noted.
3.34 – 3.36	Main alternatives to be outlined in the ES along with the main reasons for the final choice (taking account of environmental effect).	Justification for Horizon's reasoning will be provided.
3.35	Alternative sites do not need to be assessed but other matters should be included, such as alternative design options, means of dealing with radioactive waste management and the secure interim storage and alternative mitigation measures.	The ES will outline the main alternative considered by Horizon, including in relation to design options, radioactive waste management and secure storage and mitigation measures.
3.36	Justification to be provided in relation to the preferred number of reactors and the reasons for the choice in terms of potential impact.	Horizon’s approach to evaluating the appropriate generating capacity for the new nuclear power station at Wylfa has been provided as part of PAC documentation
3.37	Mitigation measures to be considered and not developed in isolation as they may benefit more	Noted. The interrelationship of various impacts will be assessed and mitigation measures will be developed holistically

General Comments		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	than one topic area.	on a Project basis.
3.38	Only mitigation measures which are a firm commitment to be taken account of as part of the assessment.	Mitigation measures will be refined as the Project proposals are developed and will be consulted upon. The ES will identify suitable mitigation measures for impacts identified.
3.42 – 3.43	ES to state where environmental management plans will be utilised.	Noted. The scoping report makes reference to where environmental management plans will be utilised.

Geology, Hydrogeology and Hydrology		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.6	Study area to be drawn widely enough to enable a robust assessment.	Details of the study areas are detailed in each of the topic chapters within this Report. They are of an appropriate size to enable a robust assessment.
4.7	Dinorwic fault line (part of the Menai Strait fault line) to be noted (although seismic risk more appropriately assessed as part of site licensing by the nuclear regulators).	Noted.
4.8	Potential sources and pathways of contamination to be identified with reference to the cumulative impacts associated with the decommissioning of the Existing Power Station and how these could be managed.	Baseline findings for contaminated land are set out within this Report. The findings of the contaminated land risk assessment will be incorporated into the ES. Cumulative impacts will be addressed in the EIA and will include impacts from the decommissioning of the Existing Power Station.
4.9	Potential impacts on the Ynys Môn CAMS area should be addressed.	Horizon has reviewed the potential for impacts on the Ynys Môn CAMS and concluded that there are unlikely to be any impacts arising from the Power Station. Further consideration will be given to potential impacts on this catchment by the Associate

Geology, Hydrogeology and Hydrology		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
		Development.
4.10	Consideration of potable water supplies and possible licence abstraction limitations. Increases in water demand during construction to be addressed as well as the potential increase in waste water production.	There are no licensed abstractions nearby (Anglesey is deregulated). Horizon is working with DCWW and NRW to understand water demands (see MCD) and develop options for meeting them.
4.11	Information to be included regarding the Wylfa site water supply (raw/potable) and the supplier (DCWW/private); the potential impacts on the sewerage network, the Waste Water Treatment Works and potential to use a private treatment works; and information on DCWW assets that may be affected by the development. Details of how sewage will be treated to be included along with the potential impact of any discharges on the environment.	Further discussions to take place with DCWW over provision of potable water supply and sewage treatment.

Flood Risk		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.13	Study area needs to be sufficiently robust in order to undertake the assessment.	The study area shown in Chapter 14 of this Report will form the basis for ongoing consultation with regulators.
4.14	Potential impacts identified include the potential for flooding that will impede the operational and emergency access to the site on the A5025. Potential impacts resulting from site to be considered.	The detailed FCA to be prepared following detailed flood hazard assessments will include consideration of Power Station Site access requirements under flood conditions during construction, operation and

Flood Risk		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
		decommissioning of the Project.
4.15	With respect to the possibility of seawall protection being built across the face of the site at Porth-y-Pistyll to the south of the site, there is no mention of assessing either this structure or the site's activities on the coast and coastal habitats (including a coastal processes assessment) in order to inform the flood risk assessment. Topic to be included on coastal processes within the ES.	An assessment of coastal processes and the potential impact on flood risk will be included in the NSFRA. The results of this assessment will inform preparation of the detailed FCA.
4.16	To be demonstrated that the site is safe in terms of flood risk and flood management over its lifetime including consideration of climate change.	Consideration of potential climate change impacts over the development lifetime, including decommissioning, will be included in the detailed flood risk assessments that are to be undertaken to support the nuclear safety case. These assessments will inform preparation of the detailed FCA.
4.17	Implications of implementing any new flood protection measures arising from the loss of floodplain in order to protect the access routes to the Power Station to be assessed.	Potential mitigations measures are identified within Chapter 14 of this Report, these will be developed further. The implications of any flood protection measures will be considered in detail as part of the NSFRA and the detailed FCA, including any measures required to eliminate any adverse impact on access route flood risk.

The Marine Environment		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.18	Relationship between marine and	The interactions with other EIA topic

The Marine Environment		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	terrestrial ecology to be addressed. The marine environment assessment to refer to other topics undertaken as part of the assessment including air quality and dust; noise and vibration; lighting; hydrogeology and soils; and groundwater as well as to consider any potential existing or future contamination.	areas will be assessed.
4.19	A species survey of marine ecology to be undertaken.	Details of surveys undertaken to date are provided in Chapter 16 of this Report. Further surveys will be undertaken as the design process progresses and will be reported in the ES.
4.20	Assessment to be based on a sufficiently wide study area.	The extent of the study area for the Marine Environment Assessment is shown in Figure 16.1.
4.21	ES to investigate the potential for introducing non-native organisms to the site, such as on machinery or soils and identify any appropriate mitigation measures as necessary.	A full bio-hazard risk assessment will be conducted as part of the EIA, and mitigation measures considered.
4.22	Detailed information to inform the choice of the location of the MOLF and CWS especially in relation to how the impacts at the CWS intake and outfall will be monitored, the potential disturbance to reef communities and habitats. . Effects on coastal processes as a result of sediment transport to be considered. Impacts of the intake/outfall structures on sediment transport to be addressed.	Work has already been undertaken to establish the impacts from the present CWS discharge and to survey Porth-y-pistyll where the CWS intake and MOLF are proposed. An environmental options appraisal will be undertaken to evaluate the potential CWS infrastructure locations. Modelling of the predicted thermal discharge is being conducted based on different design options. The possible changes in sediment regimes have been considered and will the subject of assessment. Where necessary, appropriate mitigation

The Marine Environment		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
		measures will be proposed.
4.23	ES to assess the impact of impingement and entrainment on marine organisms and address the potential harm to fish from cooling water abstraction.	Impingement and entrainment monitoring at the Existing Power Station is underway and is being undertaken in line with best practice procedures produced by the EA. The results of the entrapment and boat-based surveys undertaken to date (and described within Chapter 16 of this report along with further surveys programmed going forward will be used to assess impacts and inform appropriate mitigation measures.
4.24	Surveys to be undertaken in accordance with best practice e.g. optimal times and number of visits. Any sediment analysis to consider the potential for chemical and radionuclide contamination and the need for mitigation measures.	Marine baseline surveys have been designed in accordance with relevant best practice and legislation. Methodologies have been reviewed and approved by the NRW and Cefas. Surveys have included sediment and water quality analyses for WFD priority substances as well as an additional suite of substances and radioisotopes. Initial findings from these surveys are set out in Chapter 16 of this report.
4.25	In considering potential impact on designated sites due to CWS seawater abstraction, subsequent discharge of CW and location of MOLF, to consider expected levels of discharge and how this relates to discharge levels of Existing Power Station and explain impact of proposals on the Irish Sea.	Modelling is being undertaken to assess the thermal footprint of the CWS discharge. The expected levels of discharge and how they relate to the current levels at the Existing Power Station will be considered during the EIA process. Impacts of the Project on the Irish Sea will be assessed.
4.26	EIA to determine the impact of light pollution on biodiversity and, in particular, breeding birds and consider appropriate mitigation	Noted – to be addressed.

The Marine Environment		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	measures.	

Landscape and Visual Effects		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.27	EIA to be carried out in relation to the location, height design and numbers of reactors comprised within the development, as well as the details of other large buildings and structures.	Noted.
4.28	Effects of lighting both on and off shore to be considered and means of mitigating visual impacts on nearby properties, especially at Tregele and Cemaes.	The EIA will assess the effects of lighting and mitigation measures will be identified where appropriate.
4.31	Study area to include any potential impacts on the Anglesey AONB and North Anglesey Heritage Coast, together with potential impacts on historic parks and gardens.	The study area for the landscape and visual assessment is shown in Figure 10.2 and explained in Chapter 10 of this Report. Key viewpoints have been selected to provide a representative range of views including from sensitive receptors such as the Anglesey AONB, Heritage Coast and, where relevant, Historic Parks and Gardens.
4.32	Assessment from impacts during the decommissioning phase to be considered.	The ES will include information regarding potential impacts of decommissioning where these can be predicted with a level of confidence.
4.33	Cumulative and combined impacts (especially of potential landscape and visual implications of transmission infrastructure, and the decommissioning works including transport movements at the Existing	Cumulative impacts will be addressed in the ES. The approach is discussed in Chapter 21 of this Report.

Landscape and Visual Effects		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	Power Station).	
4.34	Mitigation measures to be considered in parallel with the measures proposed for the decommissioning of the Existing Power Station.	Noted. Horizon will discuss with Magnox Ltd the possibility of joint mitigation measures where appropriate.

Terrestrial Ecology		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.32 (bis)	Further species specific surveys have been identified and should be undertaken at an appropriate time of year.	Surveys undertaken to date are explained in Chapter 11 of this report. The survey programme has ensured that surveys are taken at appropriate times of the year. Further surveys will be undertaken as the Project develops.
4.33 (bis)	Assessment to be based on sufficiently wide study area.	The study area is shown on figure 11.1 and explained in chapter 10 of this report.
4.34 (bis)	Reference to be made to other specialist topics, e.g. landscape, noise and vibration; and air quality and dust.	The EIA will assess indirect effects and in-combination effects.
4.35	Potential impact on designated sites due to potential changes to the hydrological regime especially on the Tre'r Gof Fen SSSI. To consider potential for new drainage systems to result in a physical loss of habitats and increased sediment loading in waterways.	Noted. To be assessed as part of EIA. Design of any drainage system to take into account water quality impacts.

Terrestrial Ecology		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.36	Disturbance to important ecological areas and to bird populations using the Site and its surroundings, including the foreshore associated with construction activities to be assessed. Numbers and distribution of breeding, feeding and roosting birds in relation to the Site will need to be established.	The EIA will assess the impact of the Project on bird populations within and around the Site. Horizon has undertaken a series of bird surveys and the numbers and distribution of breeding, feeding and roosting birds are being assessed, a summary of the findings of these surveys are set out in chapter 11 of this report.
4.37	Consider the loss, damage or fragmentation of internationally designated sites and the loss of priority species using these habitats.	Horizon is undertaking an HRA and the findings will be incorporated in the ES.
4.38	EIA to include the decommissioning phase.	The ES will include information regarding potential impacts of decommissioning where these can be predicted with a level of confidence.
4.39	Risk of accidental pollution of the local environment to be considered (for example spillage of oil or other fuels).	Noted. To be assessed as part of the EIA.
4.40	Measures to enhance the biodiversity to be considered and linked to any landscape mitigation	A LEMP is being prepared that will include opportunities for enhancement.

Historic Environment		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.41	Potential impacts on buried archaeological remains that may be present to be considered (both within the proposed site boundary and offshore).	The potential impacts on archaeological remains will be assessed both on and offshore. The baseline conditions are set out in chapter 17 of this report.
4.43	Consider how to monitor any impacts on archaeological remains during construction.	Archaeological impacts will be assessed and any mitigation measures proposed as appropriate. A programme of archaeological recording and monitoring will be agreed with relevant stakeholders.

Traffic and Transport		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.44	Consider road (including pedestrian, equestrian and cycle movements), rail and shipping as well as impacts on water navigation and recreational boating (including during decommissioning).	Noted. This is being assessed as part of the EIA. Initial baseline information is set out in chapter 20 of this report.
4.45	Alternative transport options and abnormal loads to be addressed, particularly during the construction and decommissioning phases, as well as the impact of transporting radioactive waste.	Alternative transport options will be considered in the ES. The radiological impact assessment will assess the transport of radioactive waste.
4.46	Methodology to be agreed with IACC and the WG and include details of relevant years for the assessment. Consider discussing any transport management plan with the local police.	WG and IACC are being consulted. Regular meetings are held about data collection requirements and potential mitigation strategies. Any AILs that cannot be shipped by sea will require road transport and consultation will take place with the local police and set notification procedures followed.

Traffic and Transport		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.47	Impact on the Menai Suspension Bridge and the Britannia Bridge to be addressed, particularly in terms of congestion and loading and in view of the decommissioning works being undertaken at the Existing Power Station and possible effects of additional traffic on tourism.	The impacts on the Britannia Bridge will be assessed in accordance with relevant guidance. It is not envisaged that the Menai Bridge will be used for construction traffic but the potential impacts of displacement will be considered.
4.48	Assessment to consider all phases of use, including the decommissioning of the station.	Noted.
4.49	Appropriate mitigation measures to be identified including an explanation of the alternatives considered and a justification of the chosen option	Noted.

Noise and Vibration		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.50	Note the importance of establishing an appropriate and agreed baseline, in view of the proposed decommissioning of the Existing Power Station and the implications of works taking place at both sites concurrently. To take account of the fact that the noise environment will be different when the Existing Power Station is operational, closed or undergoing decommissioning.	Noted. Consultation with Stakeholders on noise is ongoing. A study area has been identified and is shown in figure 9.1. Monitoring work has been undertaken at locations identified following consultation with IACC.
4.51	Noise levels should be considered not only on site but also off site along access roads and local footpaths.	Noise levels will be assessed at offsite locations including access roads and local footpaths where appropriate. The locations for noise monitoring have been agreed with IACC and will be kept under

Noise and Vibration		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
		review as the Project develops.
4.52	Assessment to take account of the traffic assessment and provide information to inform the ecological assessments (terrestrial and marine).	Traffic noise assessment during construction and operation will be undertaken. Noise impacts on the terrestrial and marine ecology will also be assessed.
4.53	Blasting effects to be considered, especially in relation to the Existing Power Station and local residents. Consideration to be given to monitoring noise complaints.	An assessment of the impact of blasting overpressure and associated ground vibration on the Existing Power Station will be included.

Air Quality and Dust		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.54	Potential short term increases in greenhouse gases during the construction phase to be addressed.	Not an air quality issue. This will be addressed in a chapter of the ES addressing sustainability issues.
4.55	Air quality and dust levels to be considered off site along access roads and local footpaths.	Air quality and dust impacts during the construction phase will be assessed along the main routes for construction traffic. Dust and air quality impacts around the site itself during construction will be qualitatively assessed and the impact of emissions to air from diesel generators in the operational phase quantitatively assessed.
4.56	Assessment to take account of the traffic assessment in terms of increased emissions and also provide information to inform the ecological assessments (terrestrial and marine). Consider potential	The traffic assessment will provide the basis of judging where significant traffic-related air quality impacts are likely to occur on both ecological receptors, including relevant European and national conservation sites and humans.

Air Quality and Dust		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	related effects on national and Europe and designated wildlife sites due to an increase in airborne pollution especially during construction.	
4.57	Consideration to be given to monitoring dust complaints.	Dust suppression measures will be included as part of an Environmental Management Plan. This will also include a recording procedure for complaints.

Public Access and Recreation		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.58	ES to take account of the location of public rights of way, including footpaths, bridleways and byways and should clearly set out impacts on them.	Impacts on PRoW will be assessed as part of the EIA. Baseline information regarding PRoW likely to be effected are described in chapter 19 and shown on figure 19.1 of this Report. Mitigation and enhancement measures will be proposed where appropriate.
4.59	Indication to be given as to how the development will affect the existing recreational facilities and what mitigation would be appropriate in these circumstances.	Impacts on existing recreational facilities will be assessed as part of the EIA. Mitigation and enhancement measures will be proposed where appropriate.

Socio-economic Effects		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
4.60	Consider impacts on the local labour market and the availability of an appropriately skilled workforce	Noted.

Socio-economic Effects		
Ref (para)	**IPC Scoping Opinion Recommendation**	**Horizon Response**
	during the construction phase, especially in view of the demands for workers associated with the decommissioning of the Existing Power Station. The combined effects of both developments should be assessed in respect of the availability of construction workers and their accommodation.	
4.61	Additional pressure on local services to considered, including the demand for additional services such as health services and schools. Security should be addressed to include all phases of the development and potential disruption of the local population.	Noted.
4.62	Impacts on the local community should be considered. This should include the impact on the housing market; the impact on the tourist market and the impact on local culture and the Welsh language, including the effects of longer term employment opportunities in the area.	Noted – the impact on Welsh language and culture is being assessed. A LIA is being carried out and will be presented alongside the ES accompanying the DCO application
4.63	The assessment should cover all stages including decommissioning of the new station.	The ES will include information regarding potential impacts of decommissioning where these can be predicted with a level of confidence.

26 Appendix D: Noise and Vibration Modelling and Assessment Methodology Wylfa Newydd Project

HORIZON NUCLEAR POWER

ENERGY WORKING FOR BRITAIN

Noise and Vibration Modelling and Assessment Methodology

Wylfa Newydd Project

DCRM Ref Number: HNP-S5-PAC-REP-00014

Revision: 1.1

Additional Requirements or Controls			
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1 About this Report

1.1 Purpose and Applicability

This Technical Note sets out the preferred approach to the modelling and assessment of noise and vibration emissions generated by the enabling works, construction and operation of the Wylfa Newydd Project and associated development. This includes the processes and assessments required for the Habitats Regulation Assessments (HRA), where applicable, if the project is deemed to present significant effects on Natura 2000 Site(s). Consideration of underwater noise and vibration effects is outwith the scope of this report.

The scope is limited to the consents and permits required to construct and operate the Power Station and includes the consents required for enabling works (i.e. site preparation and clearance). It does not, therefore, include modelling to support detailed engineering design except where there is an interaction with the consenting studies (such as EIA mitigation).

This Technical Note will form the basis of detailed consultations with relevant stakeholders, in advance of formal applications for the Wylfa Newydd Project through the planning and environmental permitting systems. Stakeholders invited to comment on this Note will include the Environmental Health Officer of Anglesey County Council (IACC) and officers from Natural Resources Wales (NRW).

In section 2 of this Technical Note the key elements of the Wylfa Newydd Project with the potential to generate noise and vibration emissions are described, and the relevant guidance documents concerning their modelling and assessment are summarised in section 3. An overview of the modelling process is also presented in section 3, along with a discussion of the tools available and comparison of alternatives. In section 4 - 11, for each different group of noise or vibration sources the following is presented:

- Data input requirements;
- Models to be run;
- Overview of scenarios to be modelled;
- Outputs generated;
- Assessment methodology; and
- Iterative approach to mitigation design and re-assessment.

The assessment methodologies will focus on the assessment of potential impacts on human receptors. The methodology for the assessment of potential impacts on ecological receptors will be developed by appropriately experienced and qualified ecologists, albeit the assessments will use the model outputs described by this Technical Note.

This Technical Note is based upon the most up-to-date information available regarding the likely components required for the Wylfa Newydd Project, and relevant policy and guidance documents. It should be noted that the development design is evolving, and will continue to do so. This Technical Note will be updated if required, to reflect major changes in the proposed development, or the publication of new guidance.

1.2 Terms and Definitions

Table 1: Terms and Explanations

TERM	EXPLANATION
Power Station Site	The indicative area of land and sea within which the majority of the permanent Power Station buildings, plant and structures would be situated. It would include the two nuclear reactors, steam turbines, the Cooling Water System (CWS) intake / pumphouse and outfall structures and breakwaters, as well as other ancillary structures.
Wylfa Newydd Development Area	The indicative area of land including the Power Station Site and the surrounding areas that would be used for the construction and operation of the Power Station. This area will be refined through the consultation process as Horizon develops a better understanding of the size and location of the areas that will be needed for construction activities and as the setting and features of the Power Station are finalised.
Environmental Impact Assessment (EIA)	A nuclear power station is classified as an Environmental Impact Assessment (EIA) development under Schedule 1 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the Infrastructure EIA Regulations). This means that the Power Station will be subject to mandatory EIA. EIA may also be required for enabling works and Associated Developments.
Environmental Permit (EP)	An Environmental Permit under the Environmental Permitting (England and Wales) Regulations 2010 (as amended).
$L_{Aeq\ T}$	The equivalent continuous sound level and is the sound level of a steady sound having the same energy as a fluctuating sound over the same period (T). It is possible to consider this level as the ambient noise encompassing all noise at a given time. L_{Aeq} is considered the best general purpose index for environmental noise.
$L_{A10\ T}$	This index represents the noise level exceeded for 10 percent of the measurement period (T), and is a widely used descriptor of road traffic noise.
Noise emissions	Used to describe noise levels generated by and other characteristics of a noise source.
Noise immission	Used to describe the noise levels and other characteristics of noise received by a receptor.
Modelling	All calculation techniques that link noise or vibration emissions from sources to noise or vibration immission levels at receptors.
TCPA	Town and Country Planning Act. Associated Development, which has been identified so far, is subject to the Town and Country Planning Act 1990 and will require the submission of separate planning applications.
DCO	Development Consent Order. A nuclear power station is a nationally significant infrastructure project (NSIP) under the

TERM	EXPLANATION
	Planning Act 2008 (the Planning Act) and its construction and operation is authorised by a DCO granted by the Secretary of State for Energy and Climate Change.

1.3 Responsible Parties

The noise and vibration assessments will require inputs from a number of responsible parties. These are summarised in Table 2 below, along with a brief description of their roles.

Table 2: Responsible Parties

RESPONSIBLE PARTY	DESCRIPTION
Horizon Nuclear Power Ltd (Horizon)	Horizon Nuclear Power Ltd is a UK energy company developing two new nuclear power stations in the UK; it is a wholly owned subsidiary of Hitachi Ltd. Horizon will be responsible for supplying certain elements of the input data required.
HGNE	Hitachi-GE-Nuclear Energy Ltd is the reactor provider and will lead the design, equipment provision and build of the main plant. HGNE will provide (via Horizon) technical input data required.
Jacobs	Consultants appointed by Horizon to undertake the EIA and support the EP applications for the Wylfa Newydd Project and associated developments.
IACC	Isle of Anglesey County Council is the local Planning Authority responsible for determining the planning applications made under the Town and Country Planning Act (1990 as amended), and is a key consultee for the Development Consent Order (DCO). IACC will be responsible for the regulation of all land based construction activities for the Wylfa Newydd project, and for the regulation of all aspects not subject to an Environmental Permit.
NRW	Natural Resources Wales will determine the Environmental Permit Applications, and will have responsibility for the regulation of those operational activities covered by the Permits. Where relevant NRW will determine any Marine Licence applications.

2 Introduction

2.1 Project Description

The National Policy Statement for Nuclear Power Generation (EN-6) identifies the proposed site at Wylfa (and seven other sites) as potentially suitable for deployment of a new nuclear power station by the end of 2025. Horizon is currently planning to develop a new nuclear power station at Wylfa, which would deliver at least 2,700 megawatts of electricity, enough power for around five million homes.

The Wylfa Newydd Project includes the Power Station and Associated Development. The Power Station includes two UK Advanced Boiling Water Reactors to be supplied by Hitachi-GE Nuclear Energy Ltd, associated plant and ancillary structures and features including steam turbines, control and service buildings, operational plant, radioactive waste storage buildings, ancillary structures, offices and coastal developments. The coastal developments will include a Cooling Water System (intake and outfall) and Breakwater, and a Marine Off-Loading Facility (MOLF).

Associated Development required to support delivery of the Power Station include highways improvements along the A5025, Park and Ride Facilities, Logistics Centre, Off-site Temporary Worker Accommodation and The Wylfa Gateway Complex.

There are four main stages in the lifetime of the Power Station[1]:

- Stage One: Enabling Works
    - Works required to prepare the Wylfa Newydd Development Area including diversion of existing services, demolition of buildings, construction of haul and access roads, vegetation clearance and site levelling;
    - Highway improvements to the A5025; and
    - Construction of Park and Ride Facilities, Logistic Centre and off-site temporary worker accommodation.
- Stage Two: Main Construction
    - Final levelling and deep excavations, main civil activities and construction of each generating unit.
- Stage Three: Full Operation
    - Operation of the Power Station plant and systems
- Stage Four: Decommissioning

Noise and vibration emissions may arise within all of these stages, for example the use of mobile plant such as excavators and bulldozers during Stages 1 and 2, and by the use of static

[1] For further details on the activities within these stages, see the Preliminary Environmental Information Report – http://consultation.horizonnuclearpower.com/document-library/consultation-documents

plant items required during the operation of the Power Station in Stage 3. All of the stages have the potential to result in changes in road and marine traffic, and Stage 1 includes proposed road improvement schemes and construction of temporary and permanent off loading facilities. Stage Four is not included within the scope of this Technical Note, however will be taken into consideration in the Environmental Statement.

The Wylfa Newydd Project will require a number of applications to be made under different legislation to different regulators. As a nationally significant infrastructure project under the Planning Act 2008, the construction and operation must be authorised by a development consent order. Planning permissions for other parts of the Wylfa Newydd Project, as well as marine licences, environmental permits and regulatory licenses, such as a Nuclear Site Licences will also be required.

A phased approach to the modelling will be undertaken which will reflect the evolution of the Project Design and availability of information at different stages of the Wylfa Newydd Project. Modelling will be undertaken using the best available information at the time of the modelling work being undertaken, this will include input from the design process, relevant new guidance and consultation feedback. As design and operating decisions are made, and data becomes available, this information will be fed into the modelling work in order that the modelling outputs reflect as closely as possible the as built, as operated Power Station and Associated Development.

2.2 Scope

The enabling works, construction and operation of a nuclear power station and associated developments have the potential to result in noise and or/vibration emissions from mobile plant and machinery, fixed plant and machinery and road and marine traffic. These emissions have the potential to affect the quality of life enjoyed by individuals and communities, and also affect protected and designated ecological habitats.

This Technical Note documents the data collection, modelling, and assessment required to support the consent of the Power Station, including that required for the EIA, EP and Habitats Regulations Assessment (HRA) processes. It covers noise and vibration emissions for the enabling works and construction and operation of the Power Station and also construction and operation of Associated Development. It also considers noise and vibration emissions from road and marine traffic movements associated with these phases of the Wylfa Newydd Project.

The scope is limited to the consents and permits required to construct and operate the Power Station and Associated Development. For each modelling requirement the necessary modelling activity is described. The modelling requirements set out in this note may evolve with the design and in light of interaction with the regulators. Therefore, it is expected that this document will be updated or supplementary Technical Notes produced to set out specific details of the modelling and assessment approaches, for example to define specific receptor locations for each modelling requirement, or to define the study area in more detail for the modelling of road traffic emissions once traffic data are developed for the enabling works and construction and operation of the Power Station.

The scope of this report does not include modelling to support engineering design except where there is an interaction with the consenting studies (such as EIA mitigation). An example of modelling activities within scope would be for the recommendation of bund heights which form part of the landscape mounding on the Wylfa Newydd Development Area.

3 Overview

3.1 Policy and Guidance

National, regional and local policies, in addition to other guidance documents relating to noise and vibration, have been used to inform the scope of the noise and vibration assessment, and to inform the selection of appropriate modelling and assessment methodologies. Relevant documents are listed in Table 3, along with an outline of the issues included in these documents that need to be considered when determining suitable modelling and assessment methodologies.

Table 3: Guidance Documents

DOCUMENT	SUMMARY
Planning Guidance Technical Advice Note (Wales) 11: Noise (TAN11)	Sets out guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.
A Noise Action Plan for Wales 2013-2018	Details environmental noise action plans required by European Regulations and information on Wales-wide policies on noise not covered by the Regulations.
Overarching National Policy Statement for Energy (EN-1)	Sets out factors likely to influence noise impacts, the requirements of a noise assessment and general advice on mitigation measures.
National Policy Statement for Nuclear Power Generation (EN-6)	Acknowledges that the operation of a new nuclear power station is unlikely to lead to significant noise and vibration impacts.
Minerals Planning Policy (Wales) Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1)	Sets out measures, including noise and vibration limits, to reduce the impact from quarrying and similar activities. The bulk earthworks included in the Wylfa Newydd Project have some similarities with quarrying activities.
BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1 Noise	Provides guidance on the assessment and control of noise on construction sites, along with guidance on acceptable noise levels.
BS5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 2 Vibration	Provides guidance on the assessment and control of vibration on construction sites, along with guidance on acceptable vibration levels.
BS4142:2014 Methods for rating and assessing industrial and commercial sound	Methodology for rating and assessing the effects of new or existing sound sources on people inside or outside dwellings or other residential properties.
BS8233:2014 Guidance on sound insulation and noise reduction for buildings	Includes guideline values for noise levels within domestic homes and other building uses.
BS6472:2008 Guide to evaluation of human exposure to vibration in buildings	Provides guidelines for assessment of blast- induced and non-blast induced vibrations.

DOCUMENT	SUMMARY
BS EN 12354-3 Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound	Specifies a calculation model to estimate the sound insulation or the sound pressure level difference of a façade.
BS EN 12354-4 Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 4: Transmission of indoor sound to the outside.	Describes a calculation model for the sound power level radiated by the envelope of a building due to airborne sound inside that building.
Design Manual for Roads and Bridges Vol 11 Environmental Assessment Section 3 Part 7 Noise and Vibration (HD213/11) 2011 (DMRB)	Contains advice on the assessment of noise from road traffic, particularly that from new/altered roads.
Horizontal Guidance for Noise H3. Environment Agency (2002)	Contains guidance issued by the Environment Agency, but also considered relevant by NRW, on noise assessment for Environmental Permits and to assist in determining the Best Available Technique (BAT) for an installation. Confirmed by NRW as applicable to Wylfa Newydd.
Noise impact assessment – information requirements. Environment Agency (2013)	Sets out the information requirements for Environmental Permit applications which include noise modelling or spreadsheet calculations. Confirmed by NRW as applicable to Wylfa Newydd.
Procedure for the assessment of low frequency noise complaints. Contract no NANR45. (February 2005). University of Salford. Environment Agency.	Aims to assist Environmental Health practitioners to distinguish cases of complaint where a low frequency environmental sound could account for the reported disturbance.
Institute of Environmental Management and Assessment Guidelines for Noise Impact Assessment (2014)	Sets out key principles and advice on noise impact assessment, but acknowledges that impact assessment methodologies should be specific to each project.
ISO 9613-2:1996 Propagation of sound outdoors	IS0 9613 is established as the primary Standard used in the UK and much of Europe for the calculation of environmental sound propagation.
Standards Australia AS 2187.2:2006 Storage and use of Part 2: Use of explosives	Provides a calculation methodology to predict vibration levels from blasting.
World Health Organisation Guidelines for Community Noise (1999)	Presents guideline noise levels for community noise in specific environments e.g. outdoor living areas and outside bedrooms.
World Health Organisation Night Noise Guidelines for Europe (2009)	Reviews health effects associated with exposure to night-time noise and recommends noise guideline values.

3.2 Emission Sources

The 2009 Environmental Impact Assessment Scoping Report[2] identified the following possible sources of noise and vibration emissions:

- Construction Stage:
  - The operation of machinery and mobile plant e.g. excavators, pneumatic breaking equipment, generators, compressors, pumps, rock crushers, mobile cranes, site vehicles etc.;
  - The use of explosives for blasting; and
  - The movement of vehicles on the public highway accessing the site.

- Operational Stage:
  - Fixed plant items and systems such as transformers, turbine generator units, ventilation systems and pumps; and
  - Transport to and from the site e.g. workforce traffic and routine deliveries.

Additional details on the above noise and vibration sources were presented by the Preliminary Environmental Information Report (PEIR) published by Horizon in September 2014[3]. Full details of the potential noise and vibration sources, impacts and mitigation measures are provided by Chapter 10 of the PEIR. The potential noise and vibration sources are summarised below:

- Construction Stage:
  - Onshore site clearance, levelling and bulk earthworks (including blasting)
  - Offshore blasting, dredging, tunnelling and piling
  - Operation of construction machinery and equipment
  - Construction site workforce and goods vehicle traffic movements
  - Marine vessel movements
  - Demolition of buildings, including utility diversions
  - Construction of built offshore infrastructure
  - Construction of built onshore infrastructure
  - Commissioning activities

- Operational Stage:
  - Operation of the on-shore Power Station infrastructure and activities
  - Operation of the offshore Power Station infrastructure (MOLF and CWS) and activities
  - Operational workforce and goods vehicle traffic movements
  - Marine vessel movements

[2] Environmental Impact Assessment Scoping Report, Proposed Nuclear Power Station at Wylfa, Anglesey, North Wales, November 2009, Horizon Nuclear Power http://www.horizonnuclearpower.com/files/downloads/wylfa_scoping_report_nov_09.pdf

[3] http://consultation.horizonnuclearpower.com/document-library/consultation-documents

No operational sources of vibration within the Power Station Site have been identified as likely to have an impact at sensitive receptors, due to the availability and common usage of anti-vibration mounts for vibration generating machinery and plant. In addition, vibration effects from static plant would not normally be expected at receptors which are in the order of several hundred metres away from the site.

The modelling and assessment methodologies relevant to each of the above sources have been identified. Note that similar methodologies will apply to more than one noise or vibration source identified above, and hence the potential sources have been grouped together, e.g. the modelling and assessment methodologies in BS5228-1:2009+A1:2014 are relevant to aspects of both the enabling works and construction activities. The potential noise and vibration sources have been grouped into the following topics for the remainder of this report.

- Construction and Earthworks Noise.
- Construction and Earthworks Vibration.
- Power Station Operational Noise.
- Road Traffic Noise and Vibration.
- Ship Emissions.

The above noise and vibration sources and topics are focussed on the Power Station Site, however many aspects e.g. construction noise will be relevant to the Associated Development. The same modelling and assessment methodologies will be used for the Power Station Site and Associated Development. Some additional noise sources specific to certain aspects of Associated Development have also been identified, such as the Park and Ride and these are described fully in the 'Other Noise Sources' section. In addition, a number of 'site suitability' assessments will be required to assess the aspects of the proposals which comprise noise and vibration sensitive development e.g. workers accommodation, offices etc.

The modelling and assessment methodologies for cumulative effects (due to the simultaneous construction or operation of aspects of the Wylfa Newydd Project, or due to other developments in the area which are permitted or in the planning process) are also set out.

Table 4 presents these topics and their relevance to the Planning, Permitting and HRA work streams.

Table 4: Planning and Permitting Topics

Activity/process to be modelled	EIA	EP	HRA
Construction and earthworks noise	✓	X	✓
Construction and earthworks vibration	✓	X	✓
Power Station Operational Noise	✓	✓*	✓
Road Traffic Noise and Vibration	✓	X	✓
Ship Noise	✓	X	✓
Other Noise Sources	✓	X	✓
Site Suitability	✓	X	X

* For sources associated with the permitted activities only

3.3 Receptor Identification

The construction and operational noise and vibration assessments will include consideration of the following sensitive receptors in the vicinity of the Wylfa Newydd Development Area and Associated Development:

- Human receptors – when present at dwellings, schools, hospitals, places of worship, recreational areas (land and sea based), or other noise sensitive locations;
- Ecological receptors – within land-based areas designated for protected species (fauna only) and in the marine environment; and
- Infrastructure receptors – historic such as Listed Buildings and Registered Parks and Gardens, and contemporary such as the existing power station and statutory or other underground services.

As detailed by the PEIR, the topic study area for the main Power Station Site has been based on a buffer zone approximately 600m from the Wylfa Newydd Development Area. The topic study area has been identified using professional judgement and the Design Manual for Roads and Bridges (DMRB), as there is no current authoritative guidance on how far a noise study area should extend from the construction activities or operational noise sources.

Whilst construction and operational noise may be audible at distances in excess of 600m, this topic study area is large enough to encompass the nearest noise sensitive receptors, which will be used to classify the magnitude of any impacts. Based on the noise impact assessment of receptors within 600m, consideration will be given to likelihood of significant effects outside the topic study area. Local Development Plans will be reviewed in order to identify any potential new receptors within the study area.

Study areas for the Associated Development will be defined when the proposals are developed further.

3.4 Baseline

The noise and vibration assessments will make reference to a number of different baseline scenarios. These will be specific to each assessment, but will generally fall within the following categories:

- Existing baseline – existing conditions which occur during the assessment process, i.e. prior to submission of the relevant planning or permitting application. There can be two types of existing baseline:
    - Measured baseline – determined by noise or vibration measurements at locations representative of conditions experienced by the identified sensitive receptors
    - Modelled baseline – determined by calculation e.g. for road traffic noise this would be calculated based on the relevant number of traffic movements and other input parameters.

- Future baseline – conditions predicted to occur at a specified date in the future, in the absence of the aspect of the Project being assessed. Clearly, measurements of future baselines are not possible; hence all future baselines are modelled baselines.

Comparison of modelled assessment results with modelled baselines enables the change due to the development to be clearly established, whilst comparison of measured and modelled existing baselines enables the accuracy of the noise model to be appraised.

Noise sensitive receptors in Tregele, Cemaes and the more sparsely populated area to the south and west of the Wylfa Newydd Development Area are likely to be most affected by noise and vibration associated with construction and operational activities at the Power Station Site. The land within and around the Wylfa Newydd Development Area is undulating and characterised by drumlin topography with nearby properties generally having a partial view of the Power Station Site. Topography will influence both baseline and future noise levels experienced by noise sensitive receptors.

The 2010 baseline noise survey indicated[4] that noise levels in the vicinity of the Power Station Site are dominated by local and distant road traffic, noise generated by the passage of wind in vegetation and trees and some noise from the existing power station. Noise from the National Grid transformer adjacent to existing power station includes 'audible tonality' (transformer hum), which has been the subject of some adverse community response in the past. This transformer is likely to be retained even when the existing power station ceases electricity generation. The extent of the contribution of each of these noise sources will vary with weather conditions.

The 2010 survey was undertaken whilst the existing power station was generating electricity from two operational reactors. One reactor has since been shut down, which has the potential to affect the existing baseline noise conditions in the vicinity of the Wylfa Newydd Development

[4] As summarised by the Preliminary Environmental Information Report – http://consultation.horizonnuclearpower.com/document-library/consultation-documents

Area. An additional baseline survey has been discussed and agreed with IACC and NRW[5], which comprises continuous noise measurements for a minimum of 4 weeks at six locations around the Wylfa Newydd Development Area, namely:

- Tre'r Gof Isaf, east of the Wylfa Newydd Development Area;
- 10 Maes Capel, Cemaes;
- Bron Wylfa, Fford Caergybi (A5025);
- Ysgubor Ddegrm, Tregele;
- Maen y Bugail, Cemlyn Road west of the Wylfa Newydd Development Area; and
- Hafnan, Nanner Road, south west of the Wylfa Newydd Development Area.

The equipment was deployed on 30th September 2014 at five of the locations and on the13th October at Bron Wylfa due to delayed access arrangements.

Additional noise measurements will be taken in the coming months to establish the existing baseline noise levels in the vicinity of the Associated Development sites. The noise monitoring locations and methodologies will be discussed and agreed with IACC.

3.5 Common Elements of Modelling and Assessment Methodologies

3.5.1 Noise Modelling and Deliverables

Noise modelling is commonly undertaken by either spreadsheet based techniques, or by commercially available computational noise modelling software packages. Both spreadsheets and software packages can implement recognised British and International Standard noise calculation methodologies. The software packages enable a greater number of noise sources and receptors to be considered in a more efficient manner and are thus less labour intensive. Hence software packages are commonly used to evaluate the noise effects of complex projects such as Wylfa Newydd.

A number of noise modelling software packages are commercially available and in common use in the UK, as detailed by Table 5.

[5] See '*Baseline Noise Monitoring Plan Wylfa Newydd main site and surrounds*' DCRM Ref Number: HNP-S5-PAC-REP-00020.

Table 5: Noise modelling software packages

SOFTWARE	COMPANY	UK DISTRIBUTOR	COMMENTS
CadnaA	DataKustik, Germany	Campbell Associates	Used in over 60 countries. Used for European noise mapping projects. Used for Hinkley Point C. Used by Environment Agency (England)
LimA	Stapelfeldt Ingenieuresellschaft mbH, Germany	-	Used for European noise mapping projects.
SoundPLAN	Braunstein and Berndt Gmbh, Germany	Sound Plan UK&I	Used in over 50 countries. Used for German rail network mapping.
NoiseMap	NoiseMap Ltd, UK	NoiseMap Ltd	HS2, Channel tunnel rail link.
IMMI	Wolfel, Germany	PC Environmental Ltd	-

All of the above software packages have been designed to implement the calculation methodologies (detailed in Sections 4.3 to 9.3) in accordance with the relevant British or International Standards. CadnaA has been selected as the noise modelling software for the Wylfa Newydd Project due to its widespread use and proven track record on numerous projects, including the new nuclear build at Hinkley Point C. Furthermore its use has been approved by both IACC and NRW during a meeting held on 1st September 2014.

The CadnaA software allows a 3-dimensional environmental model to be constructed using digital mapping and topographic data. As part of this assessment, 3-dimensional models will be constructed for the current, future baseline years and for each relevant phase of the development(s) using data obtained from Ordnance Survey (OS) and Horizon. This will allow the assessments to incorporate changes in the topography of the site(s) and surroundings, as well as changes in the location, nature and characteristics of noise sources. The noise models will also include specific noise mitigation measures such as the earth bund at the perimeter of the Power Station Site adjacent to Tregele.

The noise modelling process is complex, but in simple terms it takes into account the following data:

- *Noise source location and height* – based on the OS and development layout plans, with an allowance made for mobile sources (e.g. construction plant) which move around the site(s) and would be at differing distances from the receptor;
- *Noise emission data* – sound power levels or sound pressure levels and directivities taken from published sources (including relevant British Standards), field measurements or data supplied by others e.g. Horizon or manufacturers;

- *Noise source on-time* – this reflects the operational hours and duration of intermittently operating noise sources;
- *Distance between noise source and receptor* – based on the development layout plans and OS digital data;
- *Receptor locations and heights* – based on OS digital data. Receiver heights of 1.5m and 4.0m above ground level will be used for both daytime and night-time periods to take into account any variations in layout and use of two storey receptors.
- *Ground contours* – from OS digital data, topographic surveys and development layout plans, including the Landscape and Biodiversity Master Plan (LBMP);
- *Building heights* – from development plans, topographic surveys or assumptions e.g. a two storey house will be assumed to have a height of 8m above ground level;
- *Locations and dimensions of barriers between noise source and receptor* – from topographic surveys and development layout plans, including LBMP.
- *Ground attenuation* – related to the type of ground cover between the source and the receptor and based on aerial photography, site observations, OS mapping and development layout plans.

CadnaA allows the calculation of noise levels at specific points (e.g. at selected receptors) or on a grid basis at a specified interval. Due to the large number of receptors identified in Section 3.3, the calculation of noise levels at each one is not considered practical. Representative receptors have been selected in order to characterise the noise effects for receptors in a certain area. These selected receptors have been chosen to ensure they represent the typical or worst case noise effects experienced within an area for the various assessment scenarios. Noise levels calculated on a grid basis will be used to plot noise contours. These are presented as Figures and should be interpreted as presenting indicative noise levels only, due to the potential inaccuracy inherent in any grid calculation which requires interpolation between calculation points.

Where the prediction of noise levels from a low number of sources or at a small number of receptors is required, spreadsheet techniques may be used in preference to CadnaA modelling, as it is likely to be more efficient. All in-house spreadsheets to be used implement recognised national or international calculation methodologies, or standard 'text book' acoustic formulae. The spreadsheets have been verified against worked examples provided in relevant publications and/or adapted from spreadsheets used to support noise assessments presented at public inquiries. Sufficient detail concerning data inputs and methodologies will be provided to allow suitably qualified and experienced acousticians to independently replicate the calculations.

The approach detailed above is relevant to the prediction of outdoor noise levels, which is sufficient for the majority of noise assessment guidelines. However, indoor noise levels can also be of relevance and are required by certain guidelines. When required, indoor noise levels will be predicted from the incident outdoor noise levels using verified spreadsheet techniques to implement standard acoustic formulae. Where details of the assumed sound insulation of the façade are not provided by the relevant guidance document (e.g. WHO guidelines assume a façade with a partly open window provides 15dB of attenuation), the BS EN 12354-3 methodology for the estimation of sound insulation will be used.

3.5.2 Vibration Modelling and Deliverables

Spreadsheet techniques, implementing national or international calculation standards are commonly used for the modelling and prediction of vibration effects at the planning/permitting stage, due to the lower number of sources and receptors considered when compared to noise assessments.

The prediction of vibration propagation through the ground is complex, and for a detailed analysis the following factors should be considered:

- Vibration propagation occurs as compression waves, shear waves, surface waves, bending waves or torsional waves, either separately or together;
- The propagation of bending waves in particular is frequency dependent;
- Propagation may occur in different media simultaneously, for example through the water contained in porous rock and the rock itself;
- Viscosity, hysteresis and relaxation effects all contribute to damping of vibration, and not all of these effects are well understood; and
- The soils, rock and structures that vibration may propagate through are often not homogenous.

As a result of these factors, the accurate prediction of vibration propagation requires complex computational models populated with detailed input data, and this process is beyond the scope of a vibration assessment at this stage of project evolution. Simple empirical prediction methods will be used in conjunction with basic data likely to be available on equipment and ground composition. These empirical prediction methods have a tendency to overestimate vibration levels and hence provide a conservative method of establishing potential vibration magnitude.

The vibration modelling deliverables will be predictions of vibration magnitudes at selected receptors. Contour plots are not considered necessary since vibration effects are commonly felt over much smaller distances than noise effects and thus fewer receptors require assessment. In the absence of sufficient detailed design data to enable predictions of vibration effects, the models will be used to predict the magnitude of the input data which will result in compliance with the relevant standard. For example if the detailed blast design for creating the Power Station development platform is not known, the models can be used to predict an appropriate charge weight (amount of explosive) which will ensure compliance with appropriate vibration limits at the receptors.

3.5.3 Assessment Methodology and Deliverables

3.5.3.1 Receptor Sensitivities and Significance

In developing the site specific significance criteria, reference will be made to the IEMA Guidelines on Noise Impact Assessment. The noise and vibration assessments will consider both the sensitivity of the receptors and the magnitude of the effect, and will include the following elements:

- Comparison of current and future baselines to understand how conditions may change in the absence of the development.

- Comparison of future baseline and development scenarios at selected phases of each development. This will enable the change in conditions to be characterised.
- Comparison of the predicted noise and vibration levels with relevant 'benchmarks' taken from national and international guidelines.

The baselines, perceptibility of change in noise levels, and relevant benchmarks will be taken into account in forming numerical assessment criteria specific to each topic and site.

The EIA Regulations will require the significance of each potential impact to be determined, however many of the assessment criteria presented in the guidance documents referred to in Table 3 are not directly related to the categories of 'significant' and 'not significant' that underpin EIA.

The determination of significance in EIA is based on the sensitivity of a particular receptor (which depends on local circumstances and the type of receptor), as well as the magnitude of noise or vibration effect. The concept of receptor sensitivity is also acknowledged by guidance relevant to EP.

With respect to the sensitivity of receptors, TAN11 focuses on residential properties as being noise sensitive, although it does cite developments such as offices, hospitals and schools as containing buildings and activities that are potentially noise sensitive. TAN11 does not differentiate between these uses in terms of the degree of sensitivity to noise, however the WHO guidelines do introduce such a concept.

The significance evaluation methodology developed for the Project will recognise that receptors have differing sensitivities to noise. For example, patients in hospitals, hospices or other healthcare facilities represent the receptors with the highest sensitivity to noise. The WHO guidelines state that *'patients have less ability to cope with stress'* and identifies people with particular diseases, medical problems and people in hospitals as '*vulnerable subgroups'*. At the other end of the scale, occupants of many commercial and industrial premises would normally be considered to be of a low sensitivity, recognising that these premises are often considerable sources of noise and vibration themselves.

The determination of significance will also take into account the duration and frequency of occurrence of the noise effect, as well as the time of day or night at which it occurs. For example, a particular noise level considered to result in significant impacts if it is due to a permanent noise source which operates frequently for long durations may be considered to result in no significant effects if it occurs infrequently for short periods. Similarly, a noise level which is considered to result in no significant effects if it occurs during normal working hours of a weekday, may be considered to result in significant effects if it occurred on a Sunday evening.

The Environmental Permit assessment will require an assessment of the noise and vibration effects of the applicable activities against the Best Available Technique (BAT) principles, as outlined by the H3 document.

3.5.3.2 Assessment Criteria

There are a number of guidance documents which are relevant to the assessment of noise from any sources, since they present benchmark noise criteria.

BS8233:2014

BS8223 contains guidance and acoustic design criteria for regulators and developers to reference during the construction or redevelopment of different occupied buildings. Amongst other information, the standard provides internal noise recommendations which represent acceptable living or working environments, and external area amenity criteria.

Table 6 presents the BS8223 design criteria for residential dwellings.

Table 6: BS8233 design criteria for residential dwellings

ACTIVITY	LOCATION	07:00 TO 23:00	23:00 TO 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (Daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,16hr}$

In terms of non-residential buildings the standard also sets out acceptable internal noise standards, as detailed in Table 7. However for internal standards within schools and hospitals the document references specific guidance produced by the Department for Education and the Department for Health.

Table 7: BS8233 Design Criteria for Non-residential dwellings

ACTIVITY	LOCATION	Design Range dB $L_{Aeq,T}$
Speech or telephone communications	Department Store, Cafeteria, Canteen, Kitchen	50 - 55
	Concourse, Corridor, Circulation space	45 -55
Study and work requiring concentration	Library, gallery, museum	40 -50
	Staff meeting room, training room	35 – 45
	Executive office	35 – 40
Listening	Place of Worship, counselling, mediation, relaxation	30 -35

Although BS8233 is not meant specifically as an assessment guideline for new noise sources, the levels detailed within can be used to indicate the level of impact within different types of building from different noise sources.

WHO Guidelines for Community Noise

This World Health Organisation (WHO) document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. According to this document, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level in outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}.

To avoid sleep disturbance, indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{Amax} for single sound events. These indoor noise levels correspond to sound pressure levels at the outside façades of the living spaces of 45 dB L_{Aeq} and 60 dB L_{Amax}. These values have been obtained by WHO assuming that the noise reduction from outside to inside with the window partly open is 15 dB.

WHO Night Noise Guidelines for Europe

The 2009 WHO publication 'Night Noise Guidelines for Europe' reviews the scientific evidence on the health effects of night-time noise exposure, and presents derived health-based guideline values. The guidelines present a night noise guideline (NNG) of 40 dB $L_{night\ (outside)}$ and an interim target of 55 dB(A) aimed at situations where the 40 dB(A) target is not achievable for various reasons. It should be noted that these guidelines are applicable to WHO European Region member States. Furthermore, the guideline value is expressed as a yearly average, and hence occasional exceedances should not necessarily be interpreted as likely to result in harmful effects.

3.5.3.3 Iterative approach and mitigation

The noise and vibration assessments will implement an iterative approach. This will ensure that identified issues can be potentially resolved at the earliest opportunity, and allow effective mitigation to be incorporated into the design. The mitigated design will then be re-assessed, and the need for any further mitigation measures determined.

The assessment deliverables may include the following:

- Technical Notes for each site, detailing the relevant numerical assessment criteria and site specific significance and/or BAT evaluation methodology;
- Interim Technical Notes presenting the assessment results for particular sites, activities or scenarios. These can be used to highlight the need for mitigation to be incorporated into the development design;
- Environmental Statement (or Report) Chapters incorporating all adopted mitigation and presenting the final assessments; and
- Environmental Permit Application text and supporting documents detailing and assessment against the principles of BAT.

4 Construction and Earthworks Noise

4.1 Scope

The construction and earthworks noise sources will include items of mobile plant such as excavators, bulldozers, dump trucks etc. These noise sources may occur during the following project activities:

- Enabling works including site preparation and clearance, for example demolition of selected existing structures, service diversions, vegetation clearance, soil strip and some site levelling works;
- All bulk earthworks required to form the development platform and landscape mounding.
- Construction of coastal development (including dredging activities);
- Construction of the Power Station and supporting onshore infrastructure (e.g. control and service buildings, operational plant, radioactive waste storage buildings and ancillary structures); and
- Construction of Associated Development.

Baselines will be determined by measurement. Modelled changes to the measured baseline to reflect changes in existing noise sources may be undertaken, e.g. cessation of the existing power station generating activities (see Section 6 below for modelling methodology). The 'with development' models will include the likely 'worst case' for each group of receptors, which is assumed to be when construction/earthworks are at their closest approach to the receptors, when there is minimal (or no) screening. Thus a number of phases of work will be modelled for each assessment.

It is envisaged that certain construction activities may be operational on a near continuous basis (for example, the concrete batching plant at the Power Station Site). Separate models will therefore be developed as required for the following time periods:

- Weekday daytime 0700-1900hrs and Saturday morning 0700-1300hrs;
- Weekday evening – 1900-2300hrs;
- Weekday night-time - 2300-0700hrs;
- Weekend daytime – Saturday 1300-1900hrs and Sunday 0700-1900hrs;
- Weekend evening – Saturday and Sunday 1900-2300hrs; and
- Weekend night-time - Saturday and Sunday 2300-0700hrs.

4.2 Input Data

In addition to the input data detailed in Section 3.5.1, which are common to various noise models, the key input data for the construction and earthworks noise models are the plant list, working areas for each plant item and working hours. The plant list should contain the following data:

- Plant item name;
- Number in concurrent use;
- Size (in terms of tonnage or power output);

- Noise emissions – based on measurements, manufacturer's details or data taken from BS5228-1:2009 + A1:2014. Octave band data will be used if available;
- On-time and activity duration – different plant items can be used either continuously or intermittently throughout the whole assessment time period, or during part of the assessment time period; and
- Traverse distance – some mobile plant will travel large distances in any one assessment time period, e.g. dozers commonly work an area of 50-100m effectively increasing the stand-off distance to the receptor for part of the assessment time period.

With respect to the on-time for each plant item, construction and earthworks operations aim to employ their machinery for as much time as possible, as it is more cost efficient and maximises output. However, practicalities of working mean that plant may have to wait for short intervals between periods of working. For example, an excavator may have to wait for a truck to reverse into position or a dozer would have to wait for a truck to arrive and tip its load.

Modern machinery is designed to automatically throttle down when not under load and therefore durations under maximum engine load are reduced. Experience has shown that, during the most efficient periods of operation at bulk earthworks sites, the typical 'on-time', or time the machinery spends at full power, is in the region of 70-83%. At other times the on-time is less than this, and may be influenced by factors such as the length of the haul or the weather. Furthermore an item of mobile plant would only emit 100% noise power at specific parts of its work cycle e.g. dump trucks hauling fully laden uphill or excavators digging into the ground.

These assessments will therefore be prepared on the basis that most mobile plant would operate at maximum efficiency (i.e. 83%). However, some plant items commonly operate below these levels e.g. an on-time of 50% for the dozers is considered more realistic, since these items spend significant periods waiting for materials to be delivered, and manoeuvring under low power. Static plant such as generators, compressors, crushers and screens will be assumed to have on-times of 100%, since it is considered likely that they will operate continuously for long periods.

Input data regarding common practice mitigation measures will also be required. There are a number of standard operating procedures that are expected to be employed at the site(s) to ensure appropriate management of potential noise emissions, and these will be assumed to be implemented:

- The use of modern plant and machinery fitted with efficient silencers designed to minimise noise levels that are generated during operations;
- Plant and machinery will not be operated with covers open or removed, to ensure effective acoustic insulation is provided;
- The effectiveness of acoustic insulation and silencers fitted to plant will be qualitatively assessed and recorded on a weekly basis. Any items of plant with defective insulation or silencers will be identified for immediate investigation and remediation;
- The plant will be properly maintained in accordance with the manufacturers' instructions to ensure that the occurrence of malfunctions that can give rise to elevated noise levels is reduced, and any malfunctions that do occur are repaired; 'Smart', warbling or

broadband reversing alarms will be fitted to all mobile plant to reduce the intrusive nature of such noise sources at distance; and,

- Pumps used nearest receptors on site will be powered by electricity wherever practicable, and all pumps and generators will be placed at locations to minimise noise emissions to sensitive receptors.

In addition, it is standard bulk earthworks practice to mitigate the potential environmental effects that can arise from the construction and reduction of soil storage mounds. This is achieved by the adoption of a sequential approach to construction/removal that results in machinery working behind an outer bund whenever practicable. Material mounds would be constructed and removed in this way, with outer bunds of ~5-10 m height providing appropriate barrier attenuation (in the region of 10dB(A)) to noise receptors.

4.3 Modelling Methodology

The modelling for construction and bulk earthworks noise will be undertaken using the CadnaA software to implement the BS5228:2009 +A1:2014 methodology. Annex F of BS5228 states that the methodology takes into account the following:

- The sound power outputs of processes and plant;
- The periods of operation of processes and plant;
- The distances from sources to receiver;
- The presence of screening by barriers;
- The reflection of sound; and
- Soft ground attenuation.

Annex F goes on to state that estimation of the effects of other factors such as meteorological conditions (particularly wind speed and direction) and atmospheric absorption is beyond the scope of the standard. It does however indicate that at distances of less than approximately 50m, the size of these effects would be small, and that at larger distances, there will be a tendency towards increased sound attenuation (i.e. reduced noise levels at receptors). However, it is acknowledged that certain combinations of meteorological conditions and site circumstances can result in increased noise levels due to focussing of the sound. Meteorological effects will therefore not be included in the construction noise modelling.

The spatial extent of the models will be defined to ensure they encompass the closest receptors in each direction, and take into account the 600m study area around the Power Station Site as defined by the PEIR. Calculation run times will also be taken into account when defining the spatial extent of the model, to ensure efficient use of resources.

4.4 Model Outputs

The model will be used to predict noise levels at selected representative receptors, and in grid format across the study area, in terms of parameter $L_{Aeq(T)}$, for each of the relevant assessment time periods. The noise contours will be presented in 3dB(A) contour bands, with additional contours added highlighting where noise levels are predicted to be similar to the numerical assessment criteria adopted. Predicted noise levels at the selected receptors will be presented in tabular format, along with the relevant numerical assessment criteria. It should be noted that

these tables will include predictions for all modelled scenarios, not just the 'worst case', so that the variation in noise levels during construction/earthworks can be characterised, rather than just the highest levels.

4.5 Assessment Methodology

The assessment of the construction and earthworks noise will be based primarily upon guidance contained with BS5228-1 and MTAN 1 respectively.

BS 5228-1:2009+A1:2014 provides two methodologies (Method 1 and Method 2) for the prediction of significance during typical construction works, based upon existing measured ambient noise levels noise change.

Example thresholds of significant effects (or potential disturbance), using Method 1 'The ABC methodology' as set out in Annex E of BS5228-1:2009, are detailed in Table 8. This method applies to residential receptors only. In Method 2, noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut-off values of 65dB, 55dB and 45dB$L_{Aeq\ T}$, from construction noise alone, for the daytime, evening and night-time periods respectively. This applies for a duration of one month or more, unless works for a shorter duration are likely to result in significant effect. The evaluation criteria are generally applicable for residential housing, hotels and hostels, buildings in religious use, schools and health or community facilities.

Table 8: BS5228-1 Method 1 ABC Significance Evaluation Methodology

ASSESSMENT CATEGORY AND THRESHOLD VALUE PERIOD (L_{AEQ})	THRESHOLD (dB(A))		
	CATEGORY A[A)]	CATEGORY B[B)]	CATEGORY C[C)]
Night time (2300 – 0700)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (0700 – 1900) and Saturdays (0700 – 1300)	65	70	75
NOTE 1: A potential significant effect is indicated if the l L_{Aeq} noise level, from the site, exceeds the threshold level for the category appropriate to the ambient noise level.			
NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. if the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total L_{Aeq} noise level for the period increases by more than 3dB due to site noise.			
NOTE 3: Applies to residential receptors only			
A)	Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values		
B)	Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values		
C)	Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values		

ASSESSMENT CATEGORY AND THRESHOLD VALUE PERIOD (L_{AEQ})		THRESHOLD (DB(A))		
		CATEGORY A[A)]	CATEGORY B[B)]	CATEGORY C[C)]
Night time (2300 – 0700)		45	50	55
[D)]	1900 – 2300 weekdays, 1300 – 2300 Saturdays and 0700 – 2300 Sundays			

It should be noted that the thresholds in BS 5228-1:2009+A1:2014 are examples and therefore there is scope for them to be adapted, if deemed necessary to local circumstances. In addition to the existing and future baseline noise levels, the Project specific numerical assessment criteria derived for each site will take into account the duration of the construction period.

With respect to the bulk earthworks, MTAN1 is considered to be relevant despite the fact that the proposed works are not designed with the objective of winning aggregates for export. The similarities in volume of materials to be excavated, moved and placed, along with comparable plant and similar timescales indicate that this guidance is applicable.

The guidance on noise within MTAN1 includes advice concerning noise limits (paragraph 88):

> "*noise limits should relate to the background noise levels, subject to a maximum daytime noise limit of 55 dB(A) where background noise levels exceed 45 dB(A). 55 dB(A) is the lower limit of the daytime noise levels where serious annoyance is caused. Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A). Night-time working limits should not exceed 42 dB(A) at noise sensitive properties. Daytime working is defined as 0700-1900 hours and night-time as 1900-0700 hours. Noise limits should be set in terms of L_{AeqT} over a 1-hour measuring period. L_{Aeq}, is the noise index used to describe the "average" level of noise that varies with time (T) and should be measured "free-field" that is, at least 3.5 metres away from a façade to prevent reflection of noise by any façade that faces the noise source. During temporary and short-term operations higher levels may be reasonable but should not exceed 67dB(A) for periods of up to 8 weeks in a year at specified noise sensitive properties*."

The final numerical assessment criteria for construction and bulk earthworks activities for each receptor group will take into account the guidance in BS5228 and MTAN1 respectively, but will also be informed by the existing and future baseline noise levels. Reference may also be made to the benchmark noise levels detailed in the WHO guidelines and BS8233.

A Neighbourhood Support Strategy is being developed for the Wylfa Newydd Project, which will provide the opportunity for local residents potentially affected by construction and/or earthworks noise to apply for noise insulation grants. The eligibility criteria for this scheme are still in development, but will aim to be consistent with or less than those detailed above.

5 Construction and Earthworks Vibration

5.1 Scope

The construction and earthworks vibration topic will be relevant to the same assessments as the corresponding noise topic detailed in section 4.1. There are a number of different potential vibration sources included in this topic, which each require different modelling and assessment methodologies:

- Blasting – associated with the bulk earthworks and formation of a level development platform at the main Power Station site;
- Tunnelling – required for the cooling water intake system at the main Power Station site, however the methodology has not been confirmed. For the purposes of this Note, use of a tunnel boring machine has been assumed. The other likely method would involve drill and blast techniques, which would be modelled and assessed in a similar way to that for the blasting associated with the bulk earthworks;
- Ground compaction – may be required at the Power Station and AD sites, however the requirement for and methodology have not been finalised. For the purposes of this Note, a worst case of vibratory compaction has been assumed;
- Piling – foundation designs for development buildings have not been finalised, therefore there is the potential for piling to be required at the Power Station and AD sites. For the purposes of this Note, a 'worst case' of percussive piling has been assumed;

A detailed consideration of air overpressure (the increased pressure of the air caused by transient airborne pressure waves generated by explosive detonation) is not considered appropriate for this scheme, largely due to the fact that Section 5.3 of BS6472-2:2008 states that the accurate prediction of air overpressure (AOP) is 'almost impossible' and goes on to state that *'…control of air overpressure should always be by its minimisation at source through appropriate blast design'.* MTAN1 states that:

> '*Because air overpressure is transmitted through the atmosphere, meteorological conditions such as wind speed and direction, cloud cover and humidity will all affect the intensity of the impact. In view of this unpredictability, planning conditions to control air overpressure are unlikely to be enforceable*'.

Hence it is considered unnecessary to carry out predictions or define any assessment criteria in this respect.

No sources of vibration likely to have the potential to affect sensitive receptors have been identified in the existing or future baseline scenarios. The development scenarios assessed will include the likely 'worst case', where it is assumed that vibration sources are positioned at their closest approach to receptors.

Whilst it is standard practice to restrict blasting operations to daylight hours only, the potential requirement to undertake tunnelling, ground compaction or piling activities during night-time periods cannot be ruled out, hence both daytime and night-time periods will be considered for these activities.

5.2 Input Data

The model input data required to predict vibration effects varies with each source and is summarised in Table 9 below. Where possible, site specific parameters will be used, derived from the construction methods statements and results of various ground investigation and testing that is on-going at the site(s). However, many details of these vibration generating activities are commonly not finalised in the project evolution until after planning approval has been gained and a contractor appointed. In this case, relevant conservative assumptions will be made and recorded, based upon professional judgement and experience.

Table 9: Input data for Vibration Modelling

VIBRATION SOURCE	INPUT PARAMETER
Blasting	Site specific regression line generated from on-site test blasts and measurements (if available)
	M or Q - Maximum instantaneous charge mass (effective charge mass per delay)
	Kg - Site constant for groundborne vibration prediction
	B - Site constant for groundborne vibration prediction
	M or R – distance between charge and receptor
Tunnelling	x – distance between machine and receptor, measured along ground surface
Vibratory Compaction	nd – number of vibrating drums
	ks – scaling factor
	A – maximum amplitude of drum vibration (mm)
	Ld – vibrating roller drum width (m)
	x – distance to receptor
Percussive Piling	Kp – scaling factor
	W – nominal hammer energy (J)
	R – slope distance from pile toe

Standard good practice measures in blast design will be taken into account in the modelling process. For example, charge reducing techniques will be considered, such as complex decking, changing the blast pattern, using smaller diameter boreholes or adopting a combination of these measures. Stemming material would be of sufficient quantity and quality to adequately confine the explosives, and care will be taken in deciding upon the optimum detonation technique for the specific site circumstances.

5.3 Modelling Methodology

The modelling for the construction and bulk earthworks vibration assessments will be undertaken using verified spreadsheet methodologies, which implement the relevant calculation standards.

The prediction of vibration from blasting is influenced by blast design details as well as the ground conditions. Prediction of vibration from blasting in accordance with the scaled distance method set out in BS5228-2:2009+A1:2014 will be undertaken if sufficient test blast data exists to generate a site specific regression line. If a suitable regression line cannot be generated groundborne vibration levels will be estimated using the Australian Standard 2187.2 and a number of conservative assumptions regarding site conditions (site constants Kg=1140 and B=1.6, representing worst case conditions).

With respect to the other vibration sources, BS5228-2:2009 +A1:2014 presents simple empirical prediction models that may be used to estimate vibration levels at distances from mechanised construction works using the basic data likely to be available on equipment and ground composition. These empirical prediction methods have a tendency to overestimate vibration levels and hence provide a conservative method of establishing potential vibration magnitude. The BS5228 approach will be used to assess possible vibration effects from tunnelling, compaction and piling activities.

The spatial extent of the vibration models will be much reduced when compared to those of the noise models; however the nearest receptors (human, ecological and infrastructure) with the potential to experience significant impacts will be included.

5.4 Model Outputs

The vibration model outputs will comprise predictions of vibration magnitudes in the form of Peak Particle Velocity (PPV) in mm/s, at selected receptor locations. These will be presented in tabular format and compared with the relevant benchmark criteria.

5.5 Assessment Methodology

The assessment of vibration impacts will be based primarily on guidance in BS5228-2, supplemented where appropriate by other standards. In particular, reference will be made to any additional vibration criteria identified by statutory service providers to protect their underground services and by Magnox for the existing power station.

BS5228 provides a summary table on human response to vibration as presented in Table 10.

Table 10: Human Response to Vibration

VIBRATION LEVEL	EFFECT
0.14mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration
0.3mm/s	Vibration might just be perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a brief exposure to this level.

BS 6472 indicates in section 6, entitled Satisfactory Vibration Magnitudes, that *"for blast vibration occurring up to three times per day the generally accepted maximum satisfactory magnitude for residential premises is a PPV of 6.0 mms^{-1}"*. However, it does also state that vibration magnitudes between 6.0 – 10.0 mms^{-1} could be used if 6.0mms^{-1} is considered to be too restrictive. MTAN1 confirms these criteria, stating:

> '*maximum level of ground vibration at vibration sensitive locations: ground vibration as a result of blasting operations should not exceed a peak particle velocity of 6 mms^{-1} ppv in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 mms^{-1} ppv*;'.

6 Power Station Operational Noise

6.1 Scope

The Power Station operational noise assessment is relevant to the EIA for the DCO and the EP. The modelling and assessment for EIA purposes will include all environmental noise sources at the Power Station Site, whilst for the EP only the environmental noise sources which form part of the permitted installation will be considered. For the purposes of both assessments, an 'environmental noise source' is defined as any part of the Power Station development that would generate or radiate noise that would be audible in the outdoor environment at the site or installation boundary.

The baselines relevant to these assessments will be determined largely by measurement of existing noise levels at selected sensitive receptors. However, due to the proposed cessation of electricity generation at the existing power station (currently programmed for December 2015) there will be a need to determine the future baseline. If the project programme does not permit additional monitoring, the future baseline can be estimated by modelling the existing power station noise emissions and subtracting them from the existing measured baseline levels. A similar approach was adopted during the existing power station EIA for decommissioning activities. If the existing power station noise emissions require modelling, a similar approach will be adopted to that detailed below for the Wylfa Newydd noise emissions.

With respect to the assessment scenarios, these will cover the following activities for the full Power Station and EP installation:

- Commissioning;
- Normal operations; and
- Planned maintenance or outages e.g. venting activities.

Operations at the Power Station will be on a continuous basis. It is assumed that the Power Station will supply a constant base load of electricity to the national grid, which will not vary with diurnal or seasonal changes. The key assessment time periods are therefore:

- 1 hour - daytime 0700-1900hrs; and
- 5 minutes - Night-time - 2300-0700hrs.

If any variation in activities is identified, e.g. according to time of day or night or on a weekday as opposed to a weekend. The time periods to be considered for the Power Station noise modelling and assessment may include any or all of the following:

- 1 hour - weekday daytime 0700-1900hrs and Saturday morning 0700-1300hrs;
- 1 hour - Weekend daytime – Saturday 1300-1900hrs and Sunday 0700-1900hrs;
- 16 hours – Weekday daytime;
- 1 hour - Evening – 1900-2300hrs; and
- 8 hours - Night-time - 2300-0700hrs.

6.2 Input Data

The input data specific to the Power Station Operational Noise assessment will include the plant list and building construction details. The plant list should contain the following data:

- Plant item name and location;
- Number in concurrent use;
- Noise emissions – based on measurements at similar facilities, manufacturer's details or data taken from published sources. Octave or third octave band data will be used if available;
- On-time and activity duration – different plant items can be used either continuously or intermittently throughout the whole assessment time period, or during part of the assessment time period; and
- Source-specific mitigation measures and their effectiveness e.g. acoustic enclosures, silencers etc.

The building construction details will include:

- Building dimensions and internal layout;
- Construction materials and thicknesses; and
- Locations and dimensions of openings.

Meteorological data will also be inputted into the model, in order to undertake appropriate sensitivity analyses. The required data will be drawn from the 10 year hourly sequential meteorological dataset obtained for the Air Quality modelling, which will be generated specifically for the Power Station Site location by the Numerical Weather Prediction model held by the Meteorological Office. In the absence of on-site historic data, recorded to Meteorological Office standards, this is considered to be the most accurate weather data set available.

6.3 Modelling Methodology

The modelling for the Power Station operations will be undertaken using the CadnaA software which implements the ISO9613-2 noise propagation algorithms. The noise prediction method described in Part 2 of the standard is general and is intended to be suitable for a wide range of engineering applications where the noise level outdoors is of interest. The ISO 9613 method considers the following major mechanisms of noise attenuation:

- Geometrical divergence (also known as distance loss or geometric damping) (Adiv);
- Atmospheric absorption (Aatm);
- Ground effect (Agr);
- Reflection from surfaces;
- Screening by obstacles (Abar);
- Miscellaneous effect (Amisc); and
- Meteorological effects (Cmet).

The method will be used to predict noise levels under metrological conditions favourable to noise propagation from the sound source to the receiver, such as downwind propagation, or equivalently, propagation under a well-developed moderate ground based (surface)

temperature inversion as can occur during low wind conditions at night. Downwind propagation conditions are quantified as those where the wind direction is within 45 degrees of line between the noise source and the receiver, at wind speeds in the range 1- 5 m/s. In addition, the method may be varied to explore the effects of a variety of metrological conditions on the long term average noise level over a period, often several months. Calculation of the long term average noise level requires statistical information on wind speed, wind direction and atmospheric temperature gradients.

Where there are a number of noise sources located within a building, the internal reverberant noise level will be determined by a spreadsheet methodology, either by the use of standard acoustic formulae in conjunction with sound power level information, or by using data from measurements undertaken in similar facilities. The sound insulation properties of the building façade will be calculated in accordance with BS EN 12345-4. The noise emissions from the façade will be calculated using standard acoustic formulae, and then entered into CadnaA to determine the noise level at the receptor locations.

The spatial extent of the models will be defined to ensure they encompass the closest receptors in each direction, and take into account the 600m study area around the Power Station Site as defined by the PEIR. Calculation run times will also be taken into account when defining the spatial extent of the model, to ensure efficient use of resources.

6.4 Model Outputs

The model will be used to predict noise levels at selected representative receptors, and in grid format across the study area, in terms of parameter $L_{Aeq(T)}$, for each of the relevant assessment time periods. The noise contours will be presented in 3dB(A) contour bands, with additional contours added highlighting where noise levels are predicted to be similar to the numerical assessment criteria adopted. Predicted noise levels at the selected receptors will be presented in Tabular format, along with the relevant numerical assessment criteria.

6.5 Assessment Methodology

The following guidance documents will be used to form relevant numerical assessment criteria:

- BS4142:2014- provides a series of methods for the assessment of the likely effects of sound on people inside or outside residential dwellings. The standard is used for the purposes of investigating complaints, assessing industrial noise sources, and assessing noise at proposed new dwellings. The procedure contained in BS 4142 is to compare the measured or predicted noise level from the source(s) in question (including any penalty applied to reflect certain acoustic features) at dwellings, with the background noise level measured in the environment. BS8233 – as outlined in Section 3.5.3.2;
- WHO Guidelines for Community Noise - as outlined in Section 3.5.3.2; and
- WHO Night Noise Guidelines for Europe - as outlined in Section 3.5.3.2.

The reporting requirements of the NRW endorsed Environment Agency document ‘Noise Impact Assessment – information requirements) will be met.

The determination of BAT for each source would be undertaken with reference to the general principles for noise control outlined in Section 3 of the IPPC Horizontal Guidance H3 Part 2.

7 Road Traffic Noise and Vibration

7.1 Scope

The road traffic noise topic is relevant to the following assessments:

- Construction stage of all developments (enabling works, Power Station and Associated Development); and
- Operational stage of all developments (enabling works, Power Station and Associated Development).

In particular, traffic noise will be key to the noise assessment which accompanies the application for the A5025 road improvements and the Nanner Road improvement scheme. However, it should be noted that these assessments will focus on the effects of the road schemes only. Noise effects associated with the increases in traffic due other components of the Wylfa Newydd Project will be dealt with on a site specific basis for each application.

With respect to road traffic vibration, guidance within DMRB states that there are two impacts which need to be considered:

- Impacts on buildings – DMRB reports that extensive research has found no evidence that traffic induced vibrations are a source of significant damage to buildings. Any significant ground-borne vibrations are associated with irregularities in the road surface, which should not be present in new roads, and can easily be rectified by maintenance in older roads.
- Disturbance to occupiers – Groundborne vibration is much less likely to cause disturbance than airborne vibration and can be rectified as detailed above. Disturbance due to traffic induced airborne vibration has been found to be closely correlated with the $L_{A10\ 18\ hrs}$ noise index, and can hence be assessed using noise modelling, rather than vibration models.

No traffic induced vibration modelling is therefore considered necessary for any of the assessments.

The modelled existing and future baselines (do minimum scenarios) will be of key importance to the road traffic noise assessments. The validity of the existing modelled baseline will be determined by comparison with the results of noise measurements. Future baseline (do minimum) and with development (do something) models will include the following:

- Peak construction traffic flow year;
- Opening year of the development; and
- Peak operational traffic year (within 15 years of development opening).

The time periods to be modelled for each scenario will be drawn as required from the following:

- Weekday and weekend daytime– 0600-2400hrs;
- Weekday and weekend network peak traffic flow hour;
- Weekday and weekend hour showing maximum development-related change in traffic flow;

- Weekday and weekend night-time – 2300-0700hrs;
- Night-time network peak traffic flow hour; and
- Night-time hour showing maximum development-related change in traffic flow.

7.2 Input Data

The input data specific to the Road Traffic Noise and Vibration modelling will include both the existing and any proposed new road layout details. The input data should contain the following information for each road segment included in the model:

- Traffic flow data in terms of 18 hr annual average weekday traffic (AAWT) (06:00 – 24:00 hrs) and hourly (including peak flows) flows during the time periods indicated in section 7.1 above. In addition, night-time flows (23:00 – 07:00 hrs);
- Average speeds (or if not available speed limits);
- The percentage of heavy goods vehicles (% HGVs);
- The type of road surface (if known) otherwise a default of impervious, 2mm texture depth will be used; and
- Noise emission data (sound power levels or sound pressure levels at a specified distance obtained from measurements or published sources, to include L_{Aeq} and L_{Amax} data) for light vehicles and heavy goods vehicles.

In addition to the above, details of any adopted road traffic noise mitigation measures would also be required. Such measures may include traffic calming, low noise road surfaces, roadside barriers and specific traffic management features.

7.3 Modelling Methodology

The modelling for the road traffic noise operations will be undertaken predominantly using the CadnaA software to implement the Department of Transport's Calculation of Road Traffic Noise (CRTN) methodology.

The noise prediction method described in the document relates to the calculation of the, Basic Noise Level (BNL) at a reference distance of 10m from the edge of the nearside carriageway. This is calculated using CRTN formulae and inputs from the first four bullet points in Section 7.2 above. In some cases, verified spreadsheets will be used to calculate the BNL for simple assessments, or to provide support to establish the spatial scope of CadnaA modelling required.

The remainder of the CRTN methodology involves the propagation of noise based on the BNL and takes into consideration:

- Actual distance between receptors and carriageway edge;
- The presence of barriers to propagation, including buildings;
- Ground cover correction;
- Reflection(s) from surfaces including both the receptor facade and any other reflecting facades on the opposite side of the carriageway; and
- Angle of view.

The above CRTN methodology can be used for traffic flows over certain thresholds (200 vehicles/hour or 4000 vehicles/18h day). For roads with traffic flows lower than these thresholds (i.e. 50 to 200 vehicles/hr or 1000 to 4000 vehicles/18hr day) an alternative procedure which incorporates a 'low flow' correction is available within Section 2 of CRTN which will be implemented where necessary.

In the event that vehicle flows are outwith the range of validity of even the CRTN low flow corrections (i.e. below 50 vehicles/hour or 1000 vehicles/18hr day), an alternative methodology will be required in order to model traffic noise. It is proposed to use a methodology based upon the haul road calculation method presented in BS5228-1. This method will use the input data on vehicle flows and noise emissions to predict $L_{Aeq\ T}$ noise levels, taking into account the following variables:

- Average vehicle speed;
- Distance from centre of haul road to receptor;
- Reflection and screening corrections; and
- Angle of view.

The BS5228-1 haul road methodology will be implemented by CadnaA or verified spreadsheets as appropriate to the complexities of the assessment being undertaken.

Night-time traffic noise may also be modelled in terms of the L_{Amax} parameter, which is associated with sleep disturbance effects. The ISO 9613-2 point source methodology (via CadnaA of verified spreadsheets) will be used to model noise events caused by accelerating vehicles.

The spatial extent of the CRTN, BS5228-1 and ISO9613-2 road noise modelling will be determined by the location of the nearest sensitive receptors, but will be up to 600m either side of the road.

7.4 Model Outputs

The model will be used to predict noise levels at selected representative receptors, and in grid format across the study area, in terms of parameter $L_{A10(T)}$ (as per the CRTN methodology) or $L_{Aeq\ T}$ (as per the BS5228-1 methodology) for each of the relevant assessment time periods. Any noise contours will be presented in the 3dB(A) contour bands, with additional contours added highlighting where noise levels are predicted to be similar to the numerical assessment criteria adopted. Predicted noise levels (L_{A10T}, L_{AeqT} and L_{Amax}) at the selected receptors will be presented in tabular format, along with the relevant numerical assessment criteria.

7.5 Assessment Methodology

The assessment of road traffic noise will make reference to the DMRB methodology. It should be noted that DMRB was developed for Trunk Road Works, but it is acknowledged that it may be applicable in part to other road schemes. It also contains some useful guidance on the perceptibility of changes in traffic noise which can be used for the Power Station and other AD projects.

The assessment for the A5025 road improvement scheme will use the DMRB methodology to report the number of dwellings and other sensitive receptors experiencing specific changes in noise level ($L_{A10\ 18\ hr}$) in the short and long term:

- Increase of 0.1-0.9 dB
- Increase of 1.0-2.9dB
- Increase of 3-4.9dB
- Increase of 5-9.9dB
- Increase of 10+dB
- No change
- Decrease of 0.1-0.9dB
- Decrease of 1.0-2.9dB
- Decrease of 3-4.9dB
- Decrease of 5-9.9dB
- Decrease of 10+dB

The number of dwellings experiencing a change in nuisance will also be reported for traffic noise and traffic airborne vibration, using the DMRB specified banding. The DMRB methodology requires the assessment of noise levels on the façade of each dwelling, which shows the least beneficial change. This approach is acknowledged to highlight the adverse impacts of a road project. The DMRB methodology will be supplemented as appropriate by a similar assessment of the façade with the most beneficial change, to ensure the scheme's beneficial impacts are also characterised.

With respect to the assessments for the Power Station and other AD projects, changes in traffic noise will be assessed against the following statements from DMRB:

- Short term change (e.g. on opening year) of 1dB(A) is the minimum perceptible
- Long term change of 3dB(A) is the minimum perceptible

In addition, reference will be made to $L_{Aeq\ T}$ and L_{Amax} noise level benchmarks presented by the WHO guidelines and BS8233.

Traffic noise assessments also commonly make reference to the Noise Insulation Regulations 1975 (as amended 1988). These Regulations impose a duty on authorities to make a grant in respect of the cost of undertaking noise insulation buildings which meet a number of eligibility criteria. The key acoustic criteria are an $L_{A10\ 18\ hr}$ traffic noise level of 68dB(A) and a change in traffic noise level of at least 1dB(A).

The Wylfa Newydd Neighbourhood Support Strategy will provide the opportunity for local residents potentially affected by increases in traffic noise to apply for noise insulation grants. The eligibility criteria for this scheme are still in development, but will aim to be consistent with or lower than those detailed by the Noise Insulation Regulations.

8 Ship Noise Emissions

8.1 Scope

The assessment of noise from ship transportation of materials to and from the Power Station Site may be relevant to the following assessments:

- Enabling works including site preparation and clearance – a temporary landing facility may be constructed at Porth-y-pistyll;
- Bulk earthworks required to form the development platform and LMBP landforms – export of surplus materials via ship cannot be ruled out at present;
- Construction of the Power Station – construction materials may be imported via ships using the temporary land facility and/or MOLF; and
- Operation of the Power Station – the MOLF will be retained during the operational phase of the Power Station to allow import/export of materials via ship.

Baselines for these assessments will be determined largely by measurements of existing conditions, however as detailed in Section 6.1 for the Power Station Operations, the baselines will need to take into account the cessation of generation at the existing power station, either by modelling or further measurement. The development scenarios considered will include the periods with the highest levels of ship movements and/or greatest volumes of materials imported/exported.

It is envisaged that ship movements will be influenced by tides, weather and sea conditions, hence the temporary land facility and/or MOLF may be required to operate during both day and night-time periods. The time periods to be considered for the ship noise modelling and assessment will be drawn from:

- 1 hour - weekday daytime 0700-1900hrs and Saturday morning 0700-1300hrs
- 1 hour - Weekend daytime – Saturday 1300-1900hrs and Sunday 0700-1900hrs
- 16 hours – Weekday daytime
- 1 hour - Evening – 1900-2300hrs
- 5 minutes - Night-time - 2300-0700hrs
- 8 hours - Night-time - 2300-0700hrs

8.2 Input Data

The input data particular to the ship noise emissions assessment will include the following:

- Noise emission data from the range of ships likely to use the facilities, moving under full power, manoeuvring into dock and whilst stationery in dock, based on measurements, manufacturer's details or data taken from published sources (octave band or third octave band data will be used if available);
- Details of ship movements including numbers, routes, speeds, duration of docking etc.

8.3 Modelling Methodology

The modelling of ship noise emissions will be undertaken using the CadnaA software to implement the ISO9613-2 methodology, as described in Section 6.3 for the Power Station Operations. The spatial extent of the CadnaA models will be similar to that used for the Power Station Operations.

Ships will obviously travel outside of this study area. A verified spreadsheet methodology will be used to implement the ISO9613-2 methodology to predict ship emissions at relevant representative stand-off distances. If the additional project related ship traffic is considered likely to result in an increase of 25% or more in total ship movements within a designated shipping lane, then the change in overall ship noise will be estimated using standard acoustic formulae (e.g. if it is assumed that all ships have on average similar noise emission levels, an increase of 25% in ship movements would result in 1dB(A) increase in total ship noise).

8.4 Model Outputs

The model will be used to predict noise levels at selected representative receptors, and in grid format across the study area, in terms of parameter $L_{Aeq(T)}$, for each of the relevant assessment time periods. The noise contours will be presented in 3dB(A) contour bands, with additional contours added highlighting where noise levels are predicted to be similar to the numerical assessment criteria adopted. The contour plots will include marine areas within 600m of the temporary landing facility/MOLF. Predicted noise levels at the selected receptors/locations will be presented in Tabular format, along with the relevant numerical assessment criteria.

8.5 Assessment Methodology

The assessment of ship noise will primarily be undertaken by reference to the following benchmark noise criteria:

- BS8233 – as outlined in Section 3.5.3.2;
- WHO Guidelines for Community Noise - as outlined in Section 3.5.3.2; and
- WHO Night Noise Guidelines for Europe - as outlined in Section 3.5.3.2.

In addition, reference will also be made to BS4142:2014. At paragraph 1.1d) of the standard, it confirms that noise from ship movements falls within the scope of the standard. Reference may also be made to DEFRA NANR 45 if third octave data is available and indicates a potentially substantial low frequency component of the ship noise.

9 Other Noise Sources

9.1 Scope

There are a number of additional noise sources which will be introduced into the area as a direct result of the Associated Development required to build and/or operate the Power Station which do not fall into any of the topic categories above. The additional noise sources identified by the current development proposals include:

- Park and Ride;
- Logistics Centre;
- Wylfa Gateway Complex, including a Sports and Social Club; and
- Mechanical or electrical (ME) plant (on Associated Development sites) e.g. heating, ventilation, air conditioning plant (HVAC), substation etc.

The locations for some of these facilities have yet to be confirmed.

Baselines for these assessments will be determined largely by measurements of existing conditions. For assessments in the vicinity of the main Power Station Site e.g. Wylfa Gateway Complex, the existing baseline will be modified by modelling the cessation of the existing power station generation or additional measurements will be undertaken at that time. The development scenarios modelled will include periods of maximum activity e.g. maximum number of vehicle movements at the Park and Ride and Logistics Centre.

The assessment periods will be appropriate to the nature and operational hours of each noise source, but may include:

- 1 hour - weekday daytime 0700-1900hrs and Saturday morning 0700-1300hrs.
- 1 hour - Weekend daytime – Saturday 1300-1900hrs and Sunday 0700-1900hrs
- 16 hours – Weekday daytime
- 1 hour - Evening – 1900-2300hrs
- 5 minutes - Night-time - 2300-0700hrs
- 8 hours - Night-time - 2300-0700hrs

9.2 Input Data

The source specific input data required for each of these additional noise sources is detailed below:

- Park and Ride – number of light vehicle and bus movements, noise emission data for vehicle manoeuvres, operational hours;
- Logistics Centre – plant list (e.g. telehandlers, fork lift trucks etc.) with numbers, size, on-times, operational hours, traverse distance, noise emission data etc., number of HGV movements with noise emission data for manoeuvres;
- Multi-purpose sports pitch – operational hours and noise emission data for sporting activities; and

- Mechanical or electrical plant (on AD sites) e.g. heating, ventilation, air conditioning plant (HVAC), substation etc. - plant list with on-times, locations, noise emission data, operational hours, source specific mitigation e.g. acoustic enclosures etc.

9.3 Modelling Methodology

Initial evaluations of these noise sources will be undertaken using a verified spreadsheet methodology, based upon the BS5228 methodology. These calculations will be used to determine if the additional noise sources are likely to have the potential to significantly influence baseline noise levels. If so, then they will be incorporated into the CadnaA model(s) and noise predictions undertaken at sensitive receptors using the BS5228 or ISO9613-2 methodologies as appropriate. The spatial extent of these models will include the nearest sensitive receptors, and include the area where they are considered likely to significantly influence baseline noise levels.

9.4 Model Outputs

Model outputs will be in the form of tabulated immissions at receptors, and grid calculations to enable noise contour generation. Whilst the model outputs will be focussed towards the LAeq T parameter, LAmax levels will also be generated to characterise any potential night-time activities at the park and ride and logistics centre.

9.5 Assessment Methodology

The assessment of the additional noise sources will primarily be undertaken by reference to the following benchmark noise criteria:

- BS8233 – as outlined in Section 3.5.3.2
- WHO Guidelines for Community Noise - as outlined in Section 3.5.3.2
- WHO Night Noise Guidelines for Europe - as outlined in Section 3.5.3.2

In addition, reference may also be made to BS4142 for the assessment of the ME plant. If sufficiently robust noise emission data is not available for the ME sources, the BS4142 methodology will be used to determine an environmental noise design criterion which will not result in significant impacts, and which will be stipulated in the detailed design documents.

10 Cumulative effects

10.1 Scope

Each of the assessments described above considers a particular type of noise source or group of activities and their potential impacts on receptors. During both the construction and operational phases of the Power Station and Associated Development, there is the potential for more than one type of noise source or group of activities to be operational at the same time. For example, receptors close to the Wylfa Gateway Complex site may experience simultaneous noise from enabling work activities at the Power Station Site, construction noise at the Wylfa Gateway Complex site, and traffic noise associated with both activities. It is therefore important to assess whether a number of incremental non-significant increases in noise may add up to noise levels which result in an exceedance of a key benchmark noise criterion.

Furthermore, noise from committed developments (or those within the planning system) may have the potential to contribute to local noise levels within the study areas. In particular decommissioning activities of the existing power station may overlap with some enabling or construction works for the Wylfa Newydd Project. Wind turbines are operational in the vicinity of the Wylfa Newydd Development Area, including the Ryd y Groes Wind Farm which is currently the subject of re-powering proposals, and will continue to operate during the various stages of the Wylfa Newydd Project.

The exact nature and number of these cumulative and in-combination assessment scenarios has yet to be determined in detail. A timeline of all committed developments (or planned events such as decommissioning of the existing power station) and those included within the Wylfa Newydd Project will be developed to enable the potential cumulative noise and vibration effects to be assessed. Specification of the cumulative and in-combination assessment scenarios will be defined in due course and IACC and NRW will be consulted on this where required.

For the purposes of this Technical Note, the potentially overlapping Wylfa Newydd activities have been considered in this section, on the basis of the currently available information.

Baselines for these assessments will be determined largely by measurements of existing conditions, however detailed in Section 6.1 for the Power Station Operations, the baselines will need to take into account the cessation of generation of the existing power station, either by modelling or further measurement. The modelled traffic noise baselines will also be of relevance.

The time periods to be considered for the cumulative noise modelling and assessment will include:

- 16 hours – Weekday daytime
- 16 hours – Weekend daytime
- 8 hours - Night-time - 2300-0700hrs

10.2 Input Data

The input data for the cumulative modelling will comprise the results of the individual modelled baseline and with development assessments for the relevant assessment scenarios and time

periods. The occurrence of likely simultaneous noise emissions will be identified by liaison with Horizon's Project Planner responsible for maintenance of the DCO and Associated Development programmes.

With respect to noise emissions from non-Project related committed developments (or similar), the noise assessments submitted in support of the relevant applications will be analysed to obtain relevant noise emission and immission data.

10.3 Modelling Methodology

In order to provide a prediction of cumulative noise, all of the input datasets will be converted as necessary to the $L_{Aeq\ 16\ hrs}$ or $L_{Aeq\ 8hrs}$ parameter, by the CadnaA software. In the case of traffic noise, reference will be made to guidance in TAN11 which states:

'*For road traffic noise in NECs C and D, LAeq, 16h ~ LA10, 18h - 2 dB.'*

(Where an NEC is a Noise Exposure Category, on a scale of A-D, as defined by TAN11).

The relevant noise immission datasets will be added together in CadnaA, in order to generate the cumulative results. The spatial extent of the cumulative model will reflect that of the individual models; however consideration will be given to the inclusion of receptors outside of the individual models, if they are likely to experience noise from two or more sources which may result in a perceptible change to baseline noise levels.

10.4 Model Outputs

Model outputs will be in the form of tabulated immissions at selected receptors, and grid calculations to enable noise contour generation. Baseline, future development, and change due to development noise contours will be generated using 3dB contour intervals.

10.5 Assessment Methodology

The assessment of the predicted cumulative noise levels will be undertaken by reference to the following benchmark noise criteria:

- BS8233 – as outlined in Section 3.5.3.2;
- WHO Guidelines for Community Noise - as outlined in Section 3.5.3.2; and
- WHO Night Noise Guidelines for Europe - as outlined in Section 3.5.3.2.

11 Site Suitability

11.1 Scope

The proposed Power Station and Associated Developments include number of noise sensitive developments:

- On-site worker accommodation (DCO);
- Off-site worker accommodation (AD); and
- Offices, laboratory, social club and visitors centre at Wylfa Gateway Complex.

In order to assess the potential environmental impacts on future occupants of these facilities, a site suitability assessment will be undertaken in each case. The locations for some of these facilities have yet to be confirmed.

The existing and future baselines are not strictly relevant to the assessment of site suitability, since it is the future 'with development' noise levels that the occupants of the noise-sensitive developments will experience. However, reference will be made to measurements undertaken in the vicinity of the noise sensitive developments in order to ensure noise from non-development related sources is fully characterised.

The assessment periods will be appropriate to the operational hours of each noise sensitive development, but may include:

- 16 hours – Weekday daytime 0700-2300hrs
- 8 hours - Night-time - 2300-0700hrs
- 1 hour – Weekday daytime

11.2 Input Data

The cumulative and individual noise source contour plots will be analysed to obtain the likely external noise levels for each of the noise sensitive developments. Details of the likely building envelope construction will be required in order to calculate the noise break-in, and internal noise levels. In the event that detailed internal layouts and room dimensions are not available, professional judgement will be used to make conservative assumptions to ensure a cautious assessment.

11.3 Modelling Methodology

The noise break-in calculations will be undertaken using a verified spreadsheet methodology, based upon standard acoustic formulae and the approach set out in BS EN 12354-3 and BS8233.

11.4 Model Outputs

The model outputs will comprise a tabulated range of external and internal noise levels for each noise sensitive development.

11.5 Assessment Methodology

The site suitability assessments will be undertaken by reference to the following benchmark noise criteria:

- TAN11 – Sets out Noise Exposure Categories which local planning authorities should take into account when assessing residential development applications. The NECs for road traffic noise and mixed sources are detailed in Table 11, along with the corresponding advice to local authorities;
- BS8233 – as outlined in Section 3.5.3.2;
- WHO Guidelines for Community Noise - as outlined in Section 3.5.3.2; and
- WHO Night Noise Guidelines for Europe - as outlined in Section 3.5.3.2.

Table 11: TAN11 NECs for road traffic and mixed sources

NEC	DAYTIME NOISE LEVELS ($L_{AEQ0700-2300HRS}$)	NIGHT-TIME NOISE LEVELS ($L_{AEQ2300-0700HRS}$)	ADVICE
A	<55	<45	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	55-63	45-57	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	63-72	57-66	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	>72	>66	Planning permission should normally be refused.

12 Summary

This Technical Note has set out the general approach to be adopted for the noise and vibration modelling and assessments which are required to support the planning and permitting applications for the development and operation of the Power Station and Associated Development.

The noise modelling will be undertaken using the CadnaA software, supplemented where appropriate by the use of verified spreadsheets, to implement recognised UK or International calculation standards. The data inputs required include 3-D information on the development and its surrounding area, and noise source emission data (including location, on-times, operational hours, numbers of items/movements etc. The data inputs and model outputs for each specialist assessment have been detailed in the relevant sections above.

The vibration modelling will be undertaken using spreadsheets to implement relevant national calculation standards. The calculation inputs will include data describing the development layouts and ground conditions, in addition to source specific parameters such as charge mass for blasting, hammer energy for piling, and drum width for vibratory compaction are required.

The calculation methodologies, parameters, and relevant assessment guidance documents for both noise and vibration are summarised below in Table 12 for ease of reference.

Table 12: Summary of Calculation Methodologies, Output Parameters and Assessment Guidance

Topic	Calculation Methodology	Parameter	Relevant Assessment Guidance
Construction and Earthworks Noise	BS5228-1	$L_{Aeq\ T}$	BS5228 MTAN1 WHO Guidelines BS8233
Construction and Earthworks Vibration	BS5228-2 AS2187.2	PPV	BS5228 MTAN1 BS6472
Power Station Operations	ISO 9613-2 BS EN 12354-4	$L_{Aeq\ T}$	BS4142 BS8233 WHO Guidelines H3
Road Traffic Noise	CRTN BS5228-1 ISO 9613-2	$L_{A10\ T}$ $L_{Aeq\ T}$ L_{Amax}	DMRB Noise Insulation Regulations
Ship noise emissions	ISO 9613-2	$L_{Aeq\ T}$	BS8233 WHO Guidelines BS4142

Topic	CALCULATION METHODOLOGY	PARAMETER	RELEVANT ASSESSMENT GUIDANCE
Other noise sources	BS5228 ISO 9613-2	$L_{Aeq\ T}$	BS8233 WHO Guidelines BS4142
Cumulative Effects	Logarithmic decibel addition	$L_{Aeq\ T}$	BS8233 WHO Guidelines
Site Suitability	BS8233 and/or BS EN12354-3 for internal noise levels	$L_{Aeq\ T}$	TAN11 BS8233 WHO Guidelines

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