HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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9 Terrestrial and freshwater ecology

9.1 Introduction

9.1.1 This chapter describes the assessment of potential terrestrial and freshwater ecology effects resulting from the construction, operation and decommissioning of the Power Station, other on-site development (as described in chapter A1 introduction, Application Reference Number: 6.1.1), Marine Works and the Site Campus within the Wylfa Newydd Development Area.

9.1.2 Please refer to chapter B9 (terrestrial and freshwater ecology) (Application Reference Number: 6.2.9) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the terrestrial and freshwater ecology assessment; and assessment methodologies and criteria.

9.2 Study area

9.2.1 This section describes the study area relevant to the terrestrial and freshwater ecology assessment for the Wylfa Newydd Development Area.

9.2.2 The Wylfa Newydd Development Area covers marine terrestrial and freshwater habitats within which the proposed construction, operation and decommissioning of the Power Station, other on-site development, Marine Works and the Site Campus would take place. Since 2009, the terrestrial and freshwater areas of the Wylfa Newydd Development Area and, subsequently (from 2013) a 500m buffer around its boundary, have been surveyed to determine the terrestrial and freshwater ecology baseline. The 500m buffer was influenced by the results of the desk study, good practice guidelines (e.g. [RD1]), and professional judgement and is considered to be an appropriate distance beyond which most development related impacts would not extend. This study area is shown in figure D9-1 (Application Reference Number: 6.4.101).

9.2.3 The study area for background data searches was based on a 2.5km radius from the Wylfa Newydd Development Area. This search area was based on professional judgement and good practice guidelines (e.g. [RD2]), and was considered to be sufficient to account for the majority of ecological receptors that would be potentially vulnerable to effects arising from construction, operation and decommissioning activities within the Wylfa Newydd Development Area (although the search area was subsequently extended as part of the assessment of air quality changes, see below).

9.2.4 In addition, relevant ecological receptors within the study areas of other topic chapters were considered if these extended beyond the 500m study area described above and if the receptors were potentially vulnerable to effects beyond this distance. The extent of these areas and how they were selected is discussed in the relevant topic chapters (see air quality chapters B5 and D5 (Application Reference Numbers: 6.2.5 and 6.4.5); noise and vibration chapters B6 and D6 (Application Reference Numbers: 6.2.6 and 6.4.6); surface water and groundwater chapters B8 and D8 (Application Reference

Numbers: 6.2.8 and 6.4.8); and chapter B9 (Application Reference Number: 6.2.9), although a summary is provided below.

9.2.5 Where a designated site is divided by either a field survey or a desk study buffer zone, the designated site as a whole has been included within the assessment. Information relating to the specific study areas for individual receptors is provided in the respective baseline reports (see appendices) and in section 9.3.

9.2.6 The effects of changes to air quality were assessed based on best practice study areas described in chapter B5 (Application Reference Number: 6.2.5) (50m for the effects of dust; 200m for the effects of traffic emissions; and 2km for emissions from construction plant, machinery and marine vessels (increased to 15km for European Designated Sites)). The effects of changes to surface and ground water are assessed based on an identification of all sensitive receptors with hydrological connectivity to an affected waterbody (see chapter B8) (Application Reference Number: 6.2.8). Chapter C4 (air quality effects of traffic) (Application Reference Number 6.3.4) also discusses the project-wide effects of traffic emissions.

9.2.7 Additional study areas were also considered for possible road traffic-related effects (project wide) (volume C) (Application Reference Number: 6.3) and cumulative effects (volume I) (Application Reference Number: 6.9); further details relating to these study areas are provided within the respective volumes. European Designated Sites considered within the Shadow Habitats Regulations Assessment (HRA) Report (Application Reference Number: 5.2) (hereafter referred to as the 'Shadow HRA') are also included in this assessment.

9.2.8 All relevant receptors potentially vulnerable to changes in baseline conditions were identified and assessed. Within the study areas, specific surveys and assessments were defined by appropriate best practice guidelines, consultation responses and professional judgement (e.g. based on the habitat preferences of the target species). Discussions over the scope of surveys took place with Natural Resources Wales (NRW) and the Isle of Anglesey County Council (IACC) as part of the Scoping Opinion and Pre-Application Consultation processes. Further details of methodologies and the consultation process are provided in chapter B9 (Application Reference Number: 6.2.9).

9.3 Baseline environment

9.3.1 This section provides a summary of the baseline conditions for terrestrial and freshwater ecology within the study areas described in section 9.2. Values have been attributed to receptors in line with the criteria presented in table B9-12.

Statutory and non-statutory designated sites

9.3.2 The background data search included all statutory and non-statutory designated sites for nature conservation with the potential to be affected by activities within the Wylfa Newydd Development Area, and was completed in conjunction with the Shadow HRA Report (Application Reference Number:

5.2). These designated sites are illustrated in Table D9-1, figure D9-1 and figure D9-2 (Application Reference Number: 6.4.101).

9.3.3 The following sites have been classified as marine receptors and have therefore been assessed as part of chapter D13 (the marine environment) (Application Reference Number 6.4.13):

- Bae Cemlyn/Cemlyn Bay Special Area of Conservation (SAC) (excluding perennial vegetation of stony banks);
- Glannau Aberdaron and Ynys Enlli/Aberdaron Coast and Bardsey Island Special Protection Area (SPA) (excluding chough (*Pyrrhocorax pyrrhocorax*));
- Gogledd Môn Forol/North Anglesey Marine candidate Special Area of Conservation (cSAC); and
- Morwenoliaid Ynys Môn/Anglesey Terns SPA.

9.3.4 The potential effects on perennial vegetation of stony banks (a qualifying feature of Bae Cemlyn/Cemlyn Bay SAC, but not a primary reason for selection of the site) are assessed in this chapter.

9.3.5 In this chapter, chough is assessed separately as a receptor. Where effects on chough are identified, the potential influences of those effects on SPAs for which chough is a qualifying feature are also described.

9.3.6 As discussed in chapter B9 (Application Reference Number: 6.2.9), the baseline for statutory and non-statutory designated sites includes all relevant sites considered by the assessments of other relevant topic chapters, i.e. chapter D5 (Application Reference Number: 6.4.5), chapter D8 (Application Reference Number: 6.4.8) and chapter D12 (coastal processes and coastal geomorphology) (Application Reference Number: 6.4.12). The baseline also accounts for European Designated Sites considered in the Shadow HRA Report (Application Reference Number: 5.2).

9.3.7 All statutory designated sites and ancient woodland have been assigned a ‘high’ value. Non-statutory designated sites have been assigned a ‘medium’ value, (see table B9-12 in chapter B9 (Application Reference Number: 6.2.9). for an explanation of valuing receptors).

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Table D9-1 Statutory and non-statutory sites[1] included in the assessment

Site	Approximate position to the Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology
Tre'r Gof Site of Special Scientific Interest (SSSI)	Within the Wylfa Newydd Development Area	A hydrologically dependent alkaline basin mire/fen habitat with a wide range of wetland plant species, including blunt-flowered rush (*Juncus subnodulosus*) and the scarce marsh fern (*Thelypteris palustris*).
Cae Gwyn SSSI	Adjacent to the Wylfa Newydd Development Area	Two wetland areas separated by an area of heathland. Wetland areas contain bog mosses (*Sphagnum* spp.), common wetland herbs and royal fern (*Osmunda regalis*). Other notable species are cranberry (*Vaccinium oxycoccos*) and mud sedge (*Carex limosa*).
Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site	Within the Wylfa Newydd Development Area	A mixture of coastal grassland with areas of bracken (*Pteridium aquilinum*) and heather (*Calluna vulgaris*). The site is notable for chough 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. For the purposes of the assessment presented herein, Horizon is treating this site as a Wildlife Site.
Trwyn Pencarreg Wildlife Site	50m to the west	Coastal and semi-improved grassland adjacent to Porth-y-pistyll and Cemlyn Bay.
Morwenoliaid Ynys Môn /Anglesey Terns SPA	60m to the west	Breeding bird assemblage comprising Arctic tern (*Sterna paradisaea*), common tern (*Sterna hirundo*), roseate tern (*Sterna dougallii*) and Sandwich tern (*Thalasseus sandvicensis)*.

[1] Excluding ancient woodland, which is described separately in table D9-2.

Site	Approximate position to the Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology
Bae Cemlyn/Cemlyn Bay SSSI	110m to the west	Breeding bird assemblage comprising Arctic tern, common tern, roseate tern and Sandwich tern. Vegetated shingle, which is characterised by sea kale (*Crambe maritima*), sea radish (*Raphanus raphanistrum* subsp. *maritimus*) and yellow horned poppy (*Glaucium flavum*).
Bae Cemlyn/Cemlyn Bay SAC	110m to the west	Primary reasons for selection: • Coastal lagoons. Other qualifying features: • Perennial vegetation of stony banks.
Afon Wygyr Wildlife Site*	520m to the southeast	A small river with species-rich bankside vegetation, marshy grassland and small woodlands.
Cors Cromlech Wildlife Site*	700m to the east-southeast	A species-rich basic mire with fen and marshy grassland.
Arfordir Trwyn y Buarth – Porth Wen Wildlife Site*	900m to the northeast	The site is made up of coastal cliff grassland and heathland with several species-rich flushes. The grassland is floristically rich. The ornithological interest of this site is considerable.
Llyn Llygeirian SSSI*	1.5km to the south	Moderately base-rich lake. The flora of the lake as a whole includes a range of aquatic macrophyte species. Additionally, important for the occurrence of several nationally uncommon aquatic species: the two waterworts (*Elatine hydropiper*) and (*Elatine hexandra*), needle spike-rush (*Eleocharis acicularis*), spring quillwort (*Isoetes echinospora*) and pillwort (*Pilularia globulifera*).

Site	Approximate position to the Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology
Cors Cae-Owen Wildlife Site*	1.6km to the east-northeast	A small but important wetland, in a basin between scrub-covered outcrops. In the centre of the site is an area of herb-rich fen, containing a large colony of the scarce marsh fern.
Rhostir Mynydd Mechell Wildlife Site*	1.6km to the south-southeast	This site consists of five separate blocks of heathland with associated areas of marshy grassland which are designated because of their size and also because they represent the most intact part of a once much larger area of acid dry heath now much fragmented.
Tir Gwlyb Teilia Neuadd Wildlife Site*	1.7km to the east-northeast	A base rich valley mire surrounded by herb-rich wet meadows, with a few small areas of willow carr.
Cors Mynachdy Wildlife Site*	1.9km to the west-southwest	A species-rich valley mire surrounded by a large area of marshy grassland.
Glannau Ynys Gybi/Holy Island Coast SPA**	13km to the southwest	Breeding and wintering chough.
Glannau Ynys Gybi/Holy Island Coast SAC*	13km to the southwest	Primary reasons for selection: • vegetated sea cliffs of the Atlantic and Baltic coasts; and • European dry heaths. Other qualifying features: • Northern Atlantic wet heaths with *Erica tetralix*.

Site	Approximate position to the Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology
Corsydd Môn/Anglesey Fens SAC*	14km to the southeast	Primary reasons for selection: • calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; • hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp; • alkaline fens; and • Geyer's whorl snail *(Vertigo geyeri)*. Other qualifying features: • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils; • Northern Atlantic wet heaths with *Erica tetralix*; • southern damselfly *(Coenagrion mercuriale)*; and • marsh fritillary butterfly *(Euphydryas aurinia)*.
Corsydd Môn a Llyn /Anglesey and Llyn Fens Ramsar*	14km to the southeast	The site supports a suite of base-rich, calcareous fens which is a rare habitat type within the United Kingdom's biogeographical zone. The site supports a diverse flora and fauna with associated rare species and is of special value for maintaining the genetic and ecological diversity of the region.
Llyn Dinam SAC*	14km to the south	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation.
Glannau Aberdaron and Ynys Enlli/Aberdaron Coast Bardsey Island SPA**	63km to the south	Breeding and wintering chough.

Site	Approximate position to the Wylfa Newydd Development Area	Primary reasons for designation relevant to terrestrial and freshwater ecology
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal/Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands SPA**	65km to the south	Breeding and wintering chough.
Craig yr Aderyn (Bird's Rock) SPA**	89.3km to the southeast	Breeding and wintering chough.

* Site is within the air quality study area and is potentially sensitive to air quality changes;

** Site is designated for breeding and wintering chough and is included in the baseline as there may be functional links to the chough population within the Wylfa Newydd Development Area.

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9.3.8 Due to their proximity to the Wylfa Newydd Development Area, National Vegetation Classification (NVC) surveys of plant communities have been carried out to provide additional baseline information at the Tre'r Gof SSSI, the Cae Gwyn SSSI, the Cemlyn Bay SSSI, the Trwyn Pencarreg Wildlife Site and the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site (see appendix D9-8 National Vegetation Classification Technical Summary Report, Application Reference Number 6.4.41). A summary of this information is provided below, together with NVC classification codes in accordance with Rodwell (2006) [RD3].

Tre'r Gof SSSI

9.3.9 The Tre'r Gof SSSI comprised mostly:

- M13 *Schoenus nigricans – Juncus subnodulosus* mire;
- M22 fen meadow and M23 *Juncus effusus – Juncus acutiflorus* rush pasture;
- S2 *Cladium mariscus* swamp and sedge beds; and
- W1 Salix cinerea – Galium palustre sallow woodland.

9.3.10 Species of notable interest recorded during the survey included tufted sedge (*Carex elata*), slender-leaved sedge (*Carex lasiocarpa*), saw-sedge (*Cladium mariscus*), black bog rush (*Schoenus nigricans*) and marsh fern.

9.3.11 The hydrological regime that supports the wetland plant communities at the Tre'r Gof SSSI has also been extensively studied in order to produce a hydrological/hydrogeological Conceptual site model (CSM). The methods, baseline data and conclusions of the CSM are described in chapter D8 (Application Reference Number: 6.4.8).

9.3.12 A full description is provided in appendix D9-8 (Application Reference Number: 6.4.41).

Cae Gwyn SSSI

9.3.13 The Cae Gwyn SSSI comprised mostly:

- W23 *Ulex europaeus – Rubus fruticosus* scrub community;
- M5 *Carex rostrata – Sphagnum squarrosum* mire;
- M9 *Carex rostrata – Calliergonella cuspidatum* mire;
- M21 *Narthecium ossifragum – Sphagnum papillosum* mire;
- M25 *Molinia caerulea – Potentilla erecta* mire;
- M23 *Juncus effusus/acutiflorus – Galium palustre* rush pasture; and
- M29 *Hypericum elodes – Potamogeton polygonifolius* soakway.

9.3.14 The notable species royal fern and cranberry were recorded. On the south-eastern side of the higher ground was a larger area of very high quality mire containing slender-leaved sedge and mud sedge.

9.3.15 A full description is provided in appendix D9-8 (Application Reference Number: 6.4.41).

Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site

9.3.16 The Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site comprised:

- MC9 *Festuca rubra – Holcus lanatus* maritime grassland community;
- MG5 *Cynosurus cristatus – Centaurea nigra* mesotrophic grassland;
- H7 *Calluna vulgaris – Scilla verna* heath; and
- MC8a *Festuca rubra – Armeria maritima* maritime grassland.

9.3.17 A full description is provided in appendix D9-8 (Application Reference Number: 6.4.41).

Trwyn Pencarreg Wildlife Site

9.3.18 Trwyn Pencarreg Wildlife Site comprised:

- H8d *Calluna vulgaris – Ulex gallii* heath, *Scilla verna* sub-community;
- M25 *Molinia caerulea – Potentilla erecta* mire;
- MC8 *Festuca rubra – Armeria maritima* and MC9 *Festuca rubra – Holcus lanatus* maritime grassland;
- MG5 *Cynosurus cristatus – Centaurea nigra* and MG6 *Lolium perenne – Cynosurus cristatus* grasslands;
- S27 *Carex rostrata – Potentilla palustris* fen; and
- U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grasslands.

9.3.19 A full description is provided in appendix D9-8 (Application Reference Number: 6.4.41).

Bae Cemlyn/Cemlyn Bay SAC and Cemlyn Bay SSSI

9.3.20 The terrestrial elements of the Cemlyn Bay SSSI and Bae Cemlyn/Cemlyn Bay SAC were restricted to the vegetation present on the shingle bar separating Cemlyn Lagoon from the sea. The vegetation comprised sea kale, sea campion (*Silene uniflora*) and sea beet (*Beta vulgaris* ssp. *maritima*). The grassland on the landward side of the shingle bar was dominated by rough grassland species, including false oat-grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), and common ragwort (*Senecio jacobaea*).

9.3.21 The NVC communities assigned to areas of the SSSI comprised:

- SD1 *Rumex crispus – Glaucium flavum* shingle community; and
- MC6 *Atriplex prostrata – Beta vulgaris* ssp. *maritima* sea-bird cliff community.

9.3.22 The communities were consistent with the designation description. A full description is provided in appendix D9-8 (Application Reference Number: 6.4.41).

Ancient Woodland Inventory

9.3.23 There are three areas of ancient woodland within the Wylfa Newydd Development Area as shown in appendix D9-18 (Ancient Woodland Summary Report) (Application Reference Number: 6.4.41). These comprise two areas of ancient semi-natural woodland (ASNW) and one restored ancient woodland site (RAWS) [RD4]. A further 12 areas of ancient woodland are located within the 2km study area for air quality (chapter D5. Application Reference Number: 6.4.5)

Table D9-2 Ancient woodland within the study area

Inventory number	Site name	Grid ref	Size (ha)	Category	Phase 1 habitat type[2]	NVC affinity
26060	Manor Garden	SH 356 938	0.3	ASNW	Mixed plantation woodland	W8 or W9
26059	Simdda-Wen	SH 353 932	0.32	ASNW	Broadleaved woodland (plantation) and broadleaved parkland	W8 or W9
26075	The Firs Hotel	SH 352 929	0.52	RAWS	Mixed plantation woodland	W8 or W9
26076		SH 375 932	0.42	RAWS	Not known	Not known
26058		SH 375 927	1.37	ASNW	Not known	Not known
26074		SH 377 923	0.59	RAWS	Not known	Not known
26057		SH 375 917	0.39	ASNW	Not known	Not known
26073		SH 375 916	0.87	RAWS	Not known	Not known
26072		SH 374 912	1.23	RAWS	Not known	Not known
26053		SH 372 912	0.28	ASNW	Not known	Not known
26051		SH 342 908	0.29	ASNW	Not known	Not known
26052	Old Rectory,	SH 325 909	0.81	ASNW	Not known	Not known

[2] Phase 1 habitat type is only provided for ancient woodland sites located within the field survey study area.

Inventory number	Site name	Grid ref	Size (ha)	Category	Phase 1 habitat type[2]	NVC affinity
	Llanfairyng hornwy					
26054		SH 322 913	0.33	ASNW	Not known	Not known
26055		SH 321 916	0.7	ASNW	Not known	Not known
26056		SH 319 917	0.31	ASNW	Not known	Not known

9.3.24 The three areas of ancient woodland within the Wylfa Newydd Development Area were surveyed as part of a Phase 1 habitat survey completed in 2013, and were identified according to the habitat types in table D9-2 (appendix D9-7. Phase 1 Habitat Survey Technical Summary Report, Application Reference Number: 6.4.40). During these surveys, the ancient woodland sites did not present features or species that were considered representative of ancient woodland and were identified as ASNW and RAWS from background data information only. More detailed surveys in accordance with the NVC methodology were undertaken in 2016 with the results provided in appendix D9-18 (Application Reference Number: 6.4.51). The NVC surveys did not identify evidence for ancient ecological continuity and recorded a high frequency of non-native tree, shrub and herb species in all three woodlands. Based on the field surveys, it is considered that there is insufficient evidence to regard any of the three woods as ancient in origin. However, as they are listed on the Ancient Woodland Inventory, they will be treated as such, and so have been assigned a high value.

Terrestrial habitats and species

9.3.25 The potential terrestrial ecological receptors that have been identified within the study areas are summarised below.

Terrestrial habitats

9.3.26 The field survey study area was approximately 392ha, and dominated by low-quality agricultural land comprising improved grassland (approximately 43%) and poor semi-improved grassland (approximately 18%). Appendix D9-7 (Application Reference Number: 6.4.40) describes all of the habitats present that have been determined using the *Joint Nature Conservation Committee Phase 1 habitat survey approach* [RD5]. The Phase 1 habitat survey results are provided on figure D9-3 (Application Reference Number: 6.4.101).

9.3.27 Other habitats present included isolated areas of arable land, gorse (*Ulex europaeus*) scrub, and pockets of marshy grassland associated with hollows and drainage features. Additionally, the areas immediately south and east of the Existing Power Station were largely conifer plantations dominated by pine species (*Pinus* spp.).

9.3.28 The field boundaries within the Wylfa Newydd Development Area and surrounding area were generally traditional cloddiau: earth banks faced with

stone, which are often colonised with gorse and hawthorn (*Crataegus monogyna*) scrub. Where the banks had collapsed, the vegetation more closely resembled hedges, but none were recorded as being potentially 'important' under the ecological criteria of the *Hedgerows Regulations 1997*. An assessment of the importance of hedgerows against cultural heritage criteria within the *Hedgerows Regulations 1997* has been provided in chapter D11 (cultural heritage) (Application Reference Number 6.4.11).

9.3.29 There were only a very small number of standard trees present in the Wylfa Newydd Development Area and no tree preservation orders were placed on these, (made under Part VIII of the *Town and Country Planning Act 1990* and the *Town and Country Planning (Trees) Regulations 1999*).

9.3.30 In addition to the designated sites, a number of areas were identified from Phase 1 habitat surveys as having the potential to support rarer plant communities, and these were subject to NVC surveys. These included grassland habitats near Mynydd Ithel (a property immediately adjacent to the southern boundary of the Wylfa Newydd Development Area that would be used as a reptile receptor site), and coastal grasslands. Detailed survey results are set out in appendix D9-8 (Application Reference Number: 6.4.41).

9.3.31 Grassland habitats at Mynydd Ithel were floristically rich and differed significantly from the surrounding grasslands. All three agricultural grazing fields were closest to the mesotrophic grassland NVC sub-community MG5a *Cynosurus cristatus – Centaurea nigra* grassland, *Lathyrus pratensis* NVC sub community (appendix D9-8) (Application Reference Number: 6.4.41).

9.3.32 NVC surveys have also been completed in all areas of the field survey study area that have the potential to support habitats listed by Annex I of the European Community Directive of the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (the 'Habitats Directive'). Within the field survey study area, Annex I habitats comprised calcareous fens with *Cladium mariscus* and species of *Caricon davallianae* (located in the Tre'r Gof SSSI) and perennial vegetation of stony banks (present within the Cemlyn Bay SSSI/SAC and Porth-y-pistyll).

9.3.33 These surveys recorded two NVC types at seven locations outside the Wylfa Newydd Development Area that constituted perennial vegetation of stony banks; the recorded NVC types being SD1 *Rumex crispus – Glaucium flavum* shingle community and MC6 *Atriplex prostrata – Beta vulgaris* ssp. *maritima* sea-bird cliff communities (see appendix D9-8. Application Reference Number: 6.4.41).

9.3.34 Surveys also recorded sea kale (a designating feature of the Cemlyn Bay SSSI) around Porth-y-pistyll, indicating that there may be some interaction between similar vegetation types within and outside the designated sites.

9.3.35 Desk studies, Phase 1 habitat surveys and NVC surveys have identified a number of terrestrial habitats present within the Wylfa Newydd Development Area that are listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016 and/or are listed on the *Anglesey Local Biodiversity Action Plan (LBAP)* [RD6]; these are shown in figure D9-10 (Application Reference Number: 6.4.101).

9.3.36 With the exception of habitats associated with designated sites (which are assessed separately), terrestrial habitats taken together are considered to be of low value as they are dominated by agricultural grassland and are abundant in the wider landscape.

Fungi

9.3.37 The combined results from the fungi surveys and gathering of incidental data are described in the fungi technical summary report (appendix D9-1) (Application Reference Number 6.4.34). The results show that there are three sites with negligible value, and six survey sites in which the numbers of species found are indicative of assemblages with medium (three) or high value (three). Survey sites are shown in figure D-11 (Application Reference Number: 6.4.101).

9.3.38 At survey sites 1, 2 and 3, all of which lie within the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, the combined counts from all survey data were 16, 16 and 17 *Hygrocybe* spp. respectively. These counts would represent areas of grassland fungi of national importance, and would be of high value. Although the basis for determination of national importance is a threshold of 17 species or more being found, analysis in appendix D9-1 (Application Reference Number 6.4.34) suggests that it is highly likely that additional species would be found in survey sites 1 and 2, and therefore the higher level of conservation value has been assigned. Both survey sites also met the criteria for national importance based on numbers of species recorded in a single visit.

9.3.39 At survey sites 4, 5 and 6, the combined counts from all survey data were seven, 11 and eight *Hygrocybe* spp. respectively. These counts would represent areas of grassland fungi of regional importance, and would represent a receptor of medium value.

9.3.40 Based on the highest level of conservation importance, fungi have been given an overall valuation of high.

Lichen

9.3.41 Data from Cofnod, the North Wales Environmental Information Service, covering a 2.5km search around the Wylfa Newydd Development Area returned a list of 14 species that had previously been recorded within 2.5km of the Wylfa Newydd Development Area [RD7]. These species were all common and widespread, with the exception of *Caloplaca granulosa*, which is an International Union for Conservation of Nature (IUCN) Red Data Book (near threatened) species [RD8].

9.3.42 Two-hundred and sixty-two taxa of lichen were recorded during field surveys in 2013, of which one is listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016: *Schismatomma graphidioides*. Of the remaining taxa, 26 are considered Nationally Scarce, two are Nationally Rare, three are Red Data Book Vulnerable listed [RD8], four are International Responsibility and 21 were new vice county records for Anglesey (see appendix D9-2 Lichen Technical Summary Report, Application Reference Number: 6.4.35).

9.3.43 The marine, supra-littoral and rock outcrop communities around Trwyn Pencarreg Wildlife Site are considered the most valuable, being representative of the hard-rock coastal habitats typical of Anglesey, and are recognised as among the best in the British Isles. The Trwyn Pencarreg habitats are outside the Wylfa Newydd Development Area but could be subject to effects from the Wylfa Newydd Project, notably changes to air quality.

9.3.44 Areas in the northern part of the Wylfa Newydd Development Area supported notable species listed in accordance with Section 7 of the Environment (Wales) Act 2016 (see appendix D9-2, Application Reference Number: 6.4.35). These areas comprised woodland at survey location 5 and a rock outcrop at survey location 6 (see appendix D9-2, Application Reference Number: 6.4.35).

9.3.45 Of note, *Ramalina fraxinea* was recorded at survey locations 13 and 21. This species is listed as being of international significance [RD9], although it is widespread in coastal areas in Wales (appendix D9-02, Application Reference Number: 6.4.35).

9.3.46 Due to the diversity and number of notable species, the value of lichen in the field survey study area is considered to be medium.

Invasive non-native plant species

9.3.47 Invasive non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) have been recorded at several locations within the Wylfa Newydd Development Area and are listed below:

Aquatic species:

- Curly waterweed (*Lagarosiphon major*);
- Waterweed (*Elodea* spp.);
- New Zealand pigmyweed (*Crassula helmsii*);
- Parrot's-feather (*Myriophyllum aquaticum*); and
- Water fern (Azolla filiculoides).

Terrestrial species:

- Cotoneaster (*Cotoneaster* spp.);
- Japanese knotweed (*Fallopia japonica*);
- Japanese rose (*Rosa rugosa*);
- Montbretia (Crocosmia x crocosmiiflora);
- Rhododendron (Rhododendron ponticum);
- Three-cornered leek (*Alium triquetrum*); and
- Variegated yellow archangel (Lamiastrum galeobdolon subsp. argentatum).

9.3.48 These species do not form important ecological receptors, but are a constraint to construction within the Wylfa Newydd Development Area. They are therefore not assigned a value, but are discussed in terms of the mitigation

required for their successful removal, the prevention of their spreading, and their classification as contaminated waste.

Protected and notable plant species

9.3.49 The Phase 1 habitat and NVC surveys did not record any plant species that receive legal protection (appendices D9-7 and D9-8) (Application Reference Numbers: 6.4.40 and 6.4.41). Cornflower (*Centaurea cyanus*) is listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016 but was recorded within a recently planted wildflower area and so was assumed to be introduced.

9.3.50 Other notable species have been recorded in the field survey study area. These include those species listed in LBAPs [RD6]; IUCN *Red Data Book Species* [RD8]; and ancient woodland indicator species (see appendices D9-7 and D9-8, Application Reference Numbers: 6.4.40 and 6.4.41). The majority have only been recorded within designated sites (the Cae Gwyn SSSI, the Cemlyn Bay SSSI and the Tre'r Gof SSSI). As such, these species are considered as part of the assessment of those sites as a whole, and are not treated individually. This includes notable plants that feature on citations of the SSSIs, e.g. cranberry, royal fern and sea kale.

9.3.51 Notable species recorded outside designated sites include Anglesey LBAP species such as sea pink (*Armeria maritima*) in coastal grassland and water mint (*Mentha aquatica*) in wetland areas. The presence of notable species is not surprising in the context of such a large study area. Each notable species is therefore not individually assessed in this chapter, as they form important constituent parts of whole habitats, and are of low value themselves.

Terrestrial invertebrates

9.3.52 Cofnod returned a total of 536 species of invertebrate within 2.5km of the Wylfa Newydd Development Area, of which 76 are notable, i.e. listed in the Red Data Book [RD8], listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016 and/or have an associated LBAP.

9.3.53 The field surveys completed between 2011 and 2014 have produced a species list which totals 717, of which 88 were of increased conservation status (including representatives of the following orders: *Coleoptera* – beetles, *Diptera* – true flies, *Hemiptera* – true bugs, *Lepidoptera* – butterflies and moths, and *Odonata* – damselflies and dragonflies) (appendix D9-4. Terrestrial Invertebrate Technical Summary Report, Application Reference Number: 6.4.37). The species recorded included four listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016: grayling butterfly (*Hipparchia semele*); small heath butterfly (*Coenonympha pamphilus*); wall brown butterfly (*Lasiommata megera*); and the cinnabar moth (*Tyria jacobaeae*), all of which have an affinity to heathland habitats.

9.3.54 Wetter habitats were found to support the greatest number of species (including the greatest number of notable species), with grassland habitats supporting the second highest diversity of species, although this is likely to be the result of the predominance of this habitat.

9.3.55 Overall, terrestrial invertebrates are considered to be of low value due to the relatively small number of notable species recorded over such a wide survey area.

Amphibians

9.3.56 Cofnod returned records of common frog (*Rana temporaria*), common toad (*Bufo bufo*) and palmate newt (*Lissotriton helveticus*) within 2.5km of the Wylfa Newydd Development Area, with no records of great crested newt (GCN) (*Triturus cristatus*) [RD7]. There was a single GCN incidentally recorded at the Cae Gwyn SSSI during NVC surveys in 2013 (see appendix D9-9 Great Crested Newt Technical Summary Report, Application Reference Number: 6.4.42).

9.3.57 Field surveys have been carried out between 2010 and 2017. Full details of the survey types and results for surveys up until 2016 are set out in appendix D9-9 (Application Reference Number: 6.4.42). The results for the 2017 surveys are provided in appendix D9-22 (Great Crested Newt Technical Summary Report 2017) (Application Reference Number: 6.4.55). GCN have been recorded within the Cae Gwyn SSSI (ponds 11a, 11b and 12), and these were considered to support a low population (peak count of seven based on six survey visits).

9.3.58 During the GCN field surveys, common frog and palmate newt were recorded as present, and common toad was recorded breeding in numerous ponds throughout the field survey study area (see appendix D9-9) (Application Reference Number: 6.4.42). Phase 1 habitat surveys suggest that there is abundant terrestrial habitat for common toad within the Wylfa Newydd Development Area, including field boundaries, marshy and rank grassland, areas of scrub and over-grown gardens around the curtilages of demolished and existing properties.

9.3.59 The value for the GCN populations in the Wylfa Newydd Development Area is considered to be medium based on their importance and rarity on a regional scale, legal protection status and their predicted low population size.

9.3.60 Common toad is listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016, and has been assigned a low value. Common frog and palmate newt have been given a negligible value and are therefore scoped out of the assessment based on their commonality and conservation status.

9.3.61 Figure D9-4 (Application Reference Number: 6.4.101) shows the location of the GCN and toad populations.

Adder and common lizard

9.3.62 Cofnod returned records of adder (*Vipera berus*) and common lizard (*Zootoca vivipara*) within 2.5km of the Wylfa Newydd Development Area [RD7]. No records for the two other common reptile species (grass snake (*Natrix natrix*) and slow worm (*Anguis fragilis*)) were returned.

9.3.63 There were three areas in the Wylfa Newydd Development Area in which reptiles were found during surveys (sites 2, 7 and 22 (see appendix D9-10

Reptile Technical Summary Report, Application Reference Number: 6.4.43)) and the peak counts have been summarised in Table D9-3. There have also been incidental records of adder within Dame Sylvia Crowe's Mound and at Wylfa Head during other field surveys.

Table D9-3 Summary of reptile survey results

Site	Location	Species recorded	Peak count
Site 2	Un-grazed grassland immediately east of the Existing Power Station	Adder	5
		Common lizard	1
Site 7	Un-grazed area of grassland to the immediate south of the existing Visitor Centre	Adder	2
Site 22	Immediately west of and part of the Tre'r Gof SSSI	Common lizard	1

9.3.64 There is suitable habitat with the potential to support reptiles scattered throughout the Wylfa Newydd Development Area, e.g. un-grazed grassland, drystone walls, coastal grassland and scrub.

9.3.65 Adder and common lizard are assigned a low value based on these species being relatively widespread and common on a regional level; this valuation takes into account their legal protection and listing in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. Given the relatively low numbers present in areas of suitable habitat throughout the Wylfa Newydd Development Area, any effects to adder and common lizard would likely be experienced at the site level only.

Chough

9.3.66 A comprehensive discussion of baseline information for chough is provided in appendix D9-14 (Chough Baseline Report) (Application Reference Number: 6.4.47).

9.3.67 The baseline data show that, between November 2009 and March 2017, chough numbers within the chough study area have varied relatively little. The peak count was ten birds in the breeding season and six birds in the non-breeding season. Within the data up to 2015, there was no discernible pattern or trend showing an increasing or decreasing population, nor any pattern shown in the number of chicks that have been produced since 2009, the year in which monitoring started. More recently, in 2016 and 2017, the number of breeding birds at Wylfa Head has reduced to one pair.

9.3.68 The results indicated a summer population within the Wylfa Newydd Development Area comprising up to two breeding pairs and their offspring, and in winter a population of up to six birds.

9.3.69 Data from Cofnod covering a 2.5km search around the Wylfa Newydd Development Area showed that chough were well recorded in the area, with over 70 sightings of the species between 1981 and 2015 [RD7]. An additional search was completed of records held by Cofnod for the whole of Anglesey in

2017 and returned 2,170 records [RD10]. These are summarised in appendix D9-14 (Application Reference Number: 6.4.47). The peak counts of chough from desk study and field surveys suggest that the Wylfa Newydd Development Area does not form one of the locations of non-breeding-season flocking by the species which, as described by Cross and Stratford (2015) [RD11], can be upwards of 80 birds. This would also suggest that the Wylfa Newydd Development Area does not form a staging post on the regular routes taken by chough from North Wales to over-wintering sites 60km away in Snowdonia.

9.3.70 Habitats of particular importance to chough are the areas of short coastal grassland formed on thin soils in the northern areas of the Wylfa Newydd Development Area. The most extensive areas of coastal grassland are found on Wylfa Head, which itself comprises two distinct areas – the west side of Wylfa Head supports short maritime grassland grazed by common rabbits (*Oryctolagus cuniculus*), and the east side consists of a mosaic of at least four plant communities, including maritime heath, cliff and grassland habitats. These areas are particularly important as they are the closest areas of foraging habitat to the chough nest sites on the cliffs at Wylfa Head and in buildings within the Existing Power Station complex. Survey and desk study records also showed that chough currently forage along the coastline south-east of Wylfa Head towards Porth y Wylfa, and do forage further inland, albeit much more infrequently.

9.3.71 Chough is given a medium value rating because of its restricted geographical range and its listing on Annex I of Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive'), Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), and in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016.

Breeding birds

9.3.72 Cofnod provided records of bird species from within a 2.5km search area between 1994 and 2013 [RD12]. One hundred and seventy-five species were returned in the data, of which 83 species had increased levels of legal protection, had associated LBAPs [RD6] or were species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. These, and other rarely recorded notable species, are discussed in greater detail in appendix D9-11 (Breeding Bird Technical Summary Report) (Application Reference Number: 6.4.44).

9.3.73 Surveys recorded 104 species of birds over five breeding seasons (2010 to 2014 inclusive) during transects, targeted vantage point surveys and incidental observations (appendix D9-11, Application Reference Number: 6.4.44). In terms of annual species counts:

- 73 species were recorded in 2014;
- 71 species were recorded in 2013; and
- a total of 78 species from previous years of survey data (2010, 2011 and 2012 combined).

9.3.74 In total, 70 species of bird have been confirmed as breeding in the field survey study area. Of these species, 31 are 'notable', either being afforded special protection or being of conservation concern based on one of the following lists:

- species that are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- species that are listed on Annex I of the Birds Directive;
- species that are Red or Amber classified on the Birds of Conservation Concern 4 list [RD13];
- species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016; and/or
- species that have associated LBAPs.

9.3.75 Surveys suggest that the field survey study area regularly supports at least two breeding pairs of barn owl (*Tyto alba*) with both breeding (at Cafnan Farm and Caerdegog Isaf) and non-breeding roosts present (see appendix D9-12 Barn Owl Technical Summary Report, Application Reference Number: 6.4.45). Despite being observed within the field survey study area, no evidence was recorded to suggest merlin (*Falco columbarius*) and peregrine falcon (*Falco peregrinus*) breed in the Wylfa Newydd Development Area.

9.3.76 In general terms, the most important habitats for breeding birds are considered to be those that are less intensively managed. Rough grassland, hedgerows, drystone walls, buildings and scrub all offer potential nest sites. Proportionally, improved grassland and managed hedges were found to support fewer species of nesting birds.

9.3.77 In determining the value of the breeding bird assemblage in the Wylfa Newydd Development Area, the quantitative approach suggested by Fuller (1980) [RD14] was taken into consideration. Based on the species diversity and numbers recorded in context with the large size of the field survey study area and the long period over which data has been collected, breeding birds are given a low value rating.

Over-wintering and passage birds

9.3.78 The desk study [RD12] results described previously for breeding birds are also applicable to over-wintering birds, as the information provided did not differentiate between resident species and those on passage or over-wintering.

9.3.79 During field surveys, 99 species of over-wintering and passage bird were recorded, of which 56 species were notable (see above and appendix D9-13 Over-wintering and Passage Bird Technical Summary Report, Application Reference Number: 6.4.46). However, many of the notable species records were of individual birds, low numbers of birds or species recorded only in one year, indicating that the Wylfa Newydd Development Area was not of particular importance for these species.

9.3.80 Flocks (i.e. aggregations containing more than five birds) of 21 notable species were recorded during surveys. The local populations of wintering

birds used almost all habitats present within the Wylfa Newydd Development Area, including grassland (semi-improved, improved and coastal), arable fields (areas of stubble), woodland/scrub (including hedgerows) and built up areas. This is set out in detail in appendix D9-13 (Application Reference Number: 6.4.46).

9.3.81 The value of the over-wintering bird species assemblage in the field survey study area has taken into account the quantitative assessment approach used by Fuller (1980) [RD14], as well as the large size of the field survey study area and the long period over which data have been collected (see appendix D9-13, Application Reference Number: 6.4.46). Over-wintering and passage birds are given a low value rating.

Bats

9.3.82 Cofnod data search records showed that brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), noctule (*Nyctalus noctula*) and whiskered bat (*Myotis mystacinus*) have all been recorded in low numbers within 2.5km of the Wylfa Newydd Development Area [RD7].

9.3.83 There were seven species of bat recorded during the field surveys between 2009 and 2015: brown long-eared bat, common pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), Natterer's bat (*Myotis nattereri*), noctule, soprano pipistrelle (*P. pygmaeus*) and whiskered/Brandt's bat (*M. brandtii*).

Building roosts

9.3.84 Survey data identified 16 buildings within the Wylfa Newydd Development Area with roosting bats as shown in figure D9-5 (Application Reference Number: 6.4.101) and summarised in table D9-4. With the exception of a maternity roost at the Lodge, the results indicate that the majority of roosts are small transitory or daytime summer roosts of common species (appendix D9-5 Bat Technical Summary Report, Application Reference Number: 6.4.38; and, appendix D9-20 Draft Bat Mitigation Licence, Application Reference Number: 6.4.53).

Table D9-4 Summary of bat roosts within the Wylfa Newydd Development Area

Property name	Number and species	Roost types[3]	Roost value
Back-up Office Facility Back-up Auxiliary Facility	3 x brown long-eared bats	Summer roosts for small numbers of rarer species.	Medium

[3] Rarer species include brown long-eared bats and Natterer's bats with a population in Wales of 10,000–100,000, common species include common and soprano pipistrelle bats with a population in Wales of over 100,000 and rarest species include whiskered/Brandt's bats with a population in Wales under 10,000 [RD15].

Property name	Number and species	Roost types[3]	Roost value
Wylfa Sports and Social Club Building 1	1 x common pipistrelle	Summer roost for small numbers of common species.	Low
Leisure Centre Building 2	1 x unknown	Summer roost for small numbers of (assumed) common species.	Low
Nantorman Building 1	1 x soprano pipistrelle	Summer roost for small numbers of common species.	Low
Nantorman Building 2	unknown x long-eared bat	Summer roost for small numbers of rarer species.	Medium
Nantorman Building 3	2 x soprano pipistrelles	Summer roost for small numbers of common species.	Low
The Firs Hotel	1 x Natterer's bat	Summer roost for small numbers of rarer species.	Medium
The Lodge	5 x brown long-eared bats 38 x Natterer's bat 2 x soprano pipistrelles 1 x whiskered/ Brandt's bat	Summer roost for small numbers of rarest and common species. Maternity roost for medium numbers of rarer species.	Medium
Tre'r Gof Uchaf Farm Buildings 2 and 4 (buildings are joined)	1 x brown long-eared bat 2 x common pipistrelles 2 x soprano pipistrelles	Summer roost for small numbers of rarer and common species.	Medium
Tyddyn Gele Building 1	1 x common pipistrelle 6 x soprano pipistrelles 1 x whiskered/ Brandt's bat	Summer roost for small numbers of common and rarest species.	Medium
Tyddyn Gele Building 3	1 x brown long-eared bat 1 x common pipistrelle 1 x soprano pipistrelle	Summer roost for small numbers of rarer and common species.	Medium
Tyddyn Gele Building 4	1 x soprano pipistrelle	Summer roost for small numbers of common species.	Low

Property name	Number and species	Roost types[3]	Roost value
Tyddyn Gele Building 6	2 x soprano pipistrelles	Summer roost for small numbers of common species.	Low
Tyddyn Goronwy Farm Building 1	1 x common pipistrelle 1 x soprano pipistrelle	Summer roost for small numbers of common species.	Low
Tyddyn Goronwy Farm Building 3	1 x soprano pipistrelle	Summer roost for small numbers of common species.	Low

9.3.85 Bat boxes and two buildings have been erected as compensation for the loss of roosts in buildings previously demolished within the Wylfa Newydd Development Area, as shown in figure D9-5 (Application Reference Number: 6.4.101). Demolition of these structures was not related to the Wylfa Newydd Project, being required for health and safety reasons and completed under a European Protected Species Mitigation Licence (EPSML). Surveys in 2015 show that one of these compensation buildings (Tyn-y-Maes bat barn) supported 50 bats of four different species (brown long-eared, common and soprano pipistrelles, and whiskered/Brandt's bats), and is therefore considered to be a successful design.

Tree roosts

9.3.86 The assessment of trees within the Wylfa Newydd Development Area to support roosting bats was undertaken in 2010, 2011, 2012 and 2013. These surveys identified 57 trees and some areas of plantation woodland with features that have the potential to support roosting bats. No tree roosts were confirmed.

Activity

9.3.87 Activity surveys recorded common and soprano pipistrelles and *Myotis* sp. bats (these have not been separated out into individual species due to the difficulty of distinguishing *Myotis* calls). Noctules, brown long-eared bats and Nathusius' pipistrelle bats were also recorded but at extremely low levels.

9.3.88 Activity surveys consistently showed the highest levels of activity around the following locations (see appendix D9-5, (Application Reference Number: 6.4.38):

- Cafnan Farm;
- Cemlyn Road;
- Cestyll Garden;
- Cemaes community woodland;
- Dame Sylvia Crowe's Mound;
- Foel Fawr farm;

- The Firs Hotel;
- Tyddyn Gele; and
- the Visitor Centre of the Existing Power Station.

9.3.89 The levels of activity recorded were considered typical for a site supporting the number of bats known to be roosting in the field survey study area. The activity surveys showed that field boundaries were important for commuting and foraging bats, which is characteristic of agricultural landscapes such as those found in the Wylfa Newydd Development Area. Slightly higher than expected activity levels were observed in the marine interface environments, a habitat that is often assumed to be used sparingly by bats, but which can support insects associated with unimproved grassland, rotting seaweed and driftwood which bats would prey upon [RD15].

9.3.90 In summary, bats have been assigned a medium value due to the size and species composition of the population that use the habitats within the Wylfa Newydd Development Area.

Otter

9.3.91 Cofnod returned four records of otter between 1981 and 2011 within 2.5km of the Wylfa Newydd Development Area [RD12]. These records included one live sighting and three records of spraint, all from around the Cemlyn Bay area.

9.3.92 Otter were also recorded around Cemlyn Lagoon by North Wales Wildlife Trust wardens in 2015 [RD16] and 2016 [RD17]. Anecdotal records of otter predating nesting terns in 2017 have also been received (pers. comm. Horizon Environmental Coordinator)

9.3.93 Surveys identified 29 individual watercourses within the field survey study area with the potential to support otter (including Cemlyn Lagoon), as numbered and shown in appendix D9-6 Otter and Water Vole Technical Summary Report (Application Reference Number: 6.4.39), and figure D9-6 (Application Reference Number: 6.4.101). The results also showed that the coastal areas either side of the Existing Power Station have the potential to support otter.

9.3.94 Otter activity was generally focused to the west of the Wylfa Newydd Development Area, around Cemlyn Lagoon and two sections of Afon Cafnan (watercourses 10 and 12). Field evidence recorded during the surveys was generally limited to spraints, although some prints were noted. No live sightings of otter were made during the surveys.

9.3.95 The watercourses where evidence of otters was recorded, adjacent to or within the Wylfa Newydd Development Area were Nant Cemaes (watercourse 3), Afon Cafnan (watercourse 10 and 12) and Nant Caerdegog Isaf (watercourse 13). There was considered to be a high likelihood that otter also use the habitats around Porth-y-pistyll for foraging and commuting, although tides may hide the evidence of this activity.

9.3.96 There is no evidence to suggest that otter is breeding in the Wylfa Newydd Development Area, and it is therefore the foraging resource that is considered of most value. Otter have been assigned a medium value.

Water vole

9.3.97 Cofnod provided seven records of water vole from between 1986 and 2005 within 2.5km of the Wylfa Newydd Development Area [RD7]. These records were all from the Cemlyn Bay area and included live sightings, prints and burrows.

9.3.98 Evidence of water vole, including burrows, latrines and feeding remains, was recorded during field surveys in five separate locations within the field survey study area (see appendix D9-6, Application Reference Number: 6.4.39) and figure D9-6 (Application Reference Number: 6.4.101)).

9.3.99 The survey data collected illustrate that the population of water vole within the study area is dynamic, but probably in decline. The evidence for this decline comes from the loss of isolated populations, such as those at the Tre'r Gof SSSI, which disappeared in 2010. The likely cause of the loss of this population has been attributed to deterioration in habitat quality, and the susceptibility of small populations to chance extinction events such as flooding. It is considered that the robustness of the population as a whole is restricted by the level of habitat connectivity throughout the field survey study area.

9.3.100 While it is not possible to determine population sizes in an area without using capture-mark-release-recapture methods, it is possible to estimate the number of territories by using the number of latrines as a guide. Strachan *et al.* (2011) [RD18] estimate that a minimum of six latrine sites would be representative of the territory of one adult female water vole. Based on the number and density of latrines found in the field survey study area, it is likely that the number of water vole using the watercourses is very low.

9.3.101 Based on the evidence described, water vole has therefore been given a medium value based largely on the legislation protecting them and their conservation status rather than the importance of the population present.

Red squirrel

9.3.102 Red squirrel were assumed to be absent from the desk survey study area based on a lack of historic records of the species provided by Cofnod in 2015 [RD7] and the scarcity of suitable habitat in the Wylfa Newydd Development Area and local landscape. However, since October 2015, the species has been recorded twice in the Wylfa Newydd Development Area [RD19] (pers. comm. with Horizon Environmental Coordinators). Based on these sightings, it is likely that red squirrels have spread from the reintroduction sites in the south of Anglesey.

9.3.103 Following these sightings, targeted surveys were undertaken in 2016. The subsequent field surveys recorded evidence of red squirrels within seven areas of woodland habitat. The evidence consisted of feeding signs in the form of chewed pine cones and one drey (see appendix D9-17 Red Squirrel Survey Report, Application Reference Number: 6.4.50). During the surveys, no live red squirrels were seen.

9.3.104 The value for the red squirrel population in the Wylfa Newydd Development Area is considered to be medium, based on their importance and rarity on a regional scale, legal protection status, and their predicted low population size.

Notable mammals

9.3.105 Brown hare, hedgehog and polecat are listed in accordance with Section 7 of the Environment (Wales) Act 2016 and have been recorded within the Wylfa Newydd Development Area. In this assessment they are referred to as 'notable mammals'. Notable mammals have been assigned a low value based on their population within the relevant study area and their conservation status.

9.3.106 A summary of the baseline conditions with respect to these species is provided in the following paragraphs, with more detail set out in appendix D9-15 Notable Mammals Technical Summary Report (Application Reference Number: 6.4.48).

Brown hare

9.3.107 Records of brown hare from transect surveys and incidental sightings suggest the species is common within the field survey study area and widely distributed through all areas of suitable habitat in the local area (appendix D9-15, Application Reference Number: 6.4.48).

9.3.108 Dedicated surveys did not record brown hare aggregations, but these were witnessed in May 2016 in the vicinity of the Tre'r Gof SSSI (pers. com. with Horizon Environmental Coordinators). Suitable areas of habitat in the Wylfa Newydd Development Area include large open fields for foraging and sheltering during the day and areas of thicker cover, e.g. hedges, scrub and woodland, for sheltering during the night.

9.3.109 Brown hare have highly variable population densities, so it is estimated that the terrestrial habitat lost as a result of the WNDA Development could support between 70 and 140 individuals based on one animal per two to four hectares (see appendix D9-15, Application Reference Number: 6.4.48 for population estimate calculations).

Hedgehog

9.3.110 Targeted surveys in 2011 identified that this species was common and widespread throughout the field survey study area (appendix D9-15, Application Reference Number: 6.4.48). This is supported by incidental sightings of live and dead individuals recorded during other surveys in subsequent years.

Polecat

9.3.111 Polecat was recorded in 2010 and 2012 but not in 2013 during targeted surveys (see appendix D9-15, Application Reference Number: 6.4.48). The maximum number of individuals recorded from within the field survey study area was four; these were recorded from within Dame Sylvia Crowe's Mound and Wylfa Head. Polecat have large territories (between 16ha and 500ha) [RD20], making them highly mobile and adaptable to localised changes. The

number of polecat recorded is considered to represent an average population [RD20].

Freshwater habitats and species

Freshwater habitats

9.3.112 A diverse range of freshwater habitats, including ponds, streams, ditches, wetland, coastal headland pools and seepages, many of which can be considered as ephemeral water bodies, have been recorded throughout the field survey study area, as shown in appendix D9-16 (Wylfa Freshwater Baseline Surveys 2011 to 2015) (Application Reference Number: 6.4.49).

9.3.113 There are four main watercourse catchments located within the Wylfa Newydd Development Area:

- Cemlyn Catchment;
- Afon Cafnan Catchment;
- Tre'r Gof Catchment; and
- Cemaes Catchment.

9.3.114 The physical habitat of the watercourses varied from natural streams to drainage ditches, many of which appeared to have been historically modified and had lost much of their natural character. Many of these alterations were associated with field boundaries and were typical of the local area. Many of the small tributaries were ephemeral, meaning they only flow during periods of elevated rainfall or high groundwater conditions. The detailed habitat descriptions are set out in appendix D9-16 (Application Reference Number: 6.4.49).

9.3.115 The ponds within the Wylfa Newydd Development Area included artificial drainage ponds and natural surface and groundwater-fed ponds, some with ephemeral characteristics. Ponds were typically noted as poor to moderate quality using the *Predictive System for Multimetrics* [RD21]. Tregele Pond and Power Station Pond were both given a poor ecological-quality rating. However, due to the presence of two macroinvertebrate species of high conservation importance, both ponds met priority pond status [RD22]. Due to the poor quality of the ponds themselves, they have not been drawn out as individual pond receptors. Instead, the species that trigger the priority pond status have been assessed as part of the macroinvertebrate receptor (see below).

9.3.116 The freshwater habitats within the study area are common and widespread on Anglesey and are therefore considered to be of low value.

Macroinvertebrates

9.3.117 No legally protected macroinvertebrate species were identified within the desk survey or field survey study areas.

9.3.118 Full results of the macroinvertebrate sampling can be found in appendix D9-16 (Application Reference Number: 6.4.49). A total of 308 macroinvertebrate species have been recorded across the field survey study area, 42 of which

had species conservation scores of 'local' or higher. In general, the macroinvertebrate community consisted of widespread and common species dominated by beetles, molluscs, crustaceans and true bugs. The majority of the species recorded were typical of slow-flowing water with soft-substrate habitat dominated by fine sediments. The species found across the field survey study area were generally tolerant of organic pollution.

9.3.119 Two near-threatened species [RD23] were identified within the Wylfa Newydd Development Area:

- *Hydraena palustris* (minute moss beetle) was recorded in Power Station Pond; and
- *Omphiscola glabra* (mud snail) was recorded in Tregele Pond.

9.3.120 Minute moss beetle is also listed in the Red Data Book [RD24] as Vulnerable. There was only one individual minute moss beetle recorded, suggesting the population is small.

9.3.121 *O. glabra* is declining in range in the UK and is listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. Forty-two individuals were recorded in 2014, with similar numbers recorded in 2015, indicating that Tregele Pond supports a sustainable population of *O. glabra*.

9.3.122 The macroinvertebrate receptor within the field survey study area has been given two values: one for the study area as a whole and one for two individual ponds where species of higher conservation interest were located. The value of the macroinvertebrate receptor for the overall study area is considered to be low value. The identification of species of higher conservation value at Power Station Pond and Tregele Pond has resulted in the macroinvertebrate receptor in these ponds being considered to be of medium value.

Freshwater fish

9.3.123 Full results of the fish sampling can be found in appendix D9-16 (Application Reference Number: 6.4.49). Four freshwater fish species were recorded within the field survey study area:

- brown trout (*Salmo trutta*) – found in low numbers in the Afon Cafnan only;
- European eel (*Anguilla anguilla*) – found across the study area in low numbers;
- nine-spined stickleback (*Pungitius pungitius*) – found in low numbers in the Afon Cafnan only; and
- three-spined stickleback (*Gasterosteus aculeatus*) – found to be abundant in the majority of the main watercourses across the study area.

9.3.124 The fish species observed were typical of small coastal stream systems. European eel migrates between the marine and freshwater environments as part of its lifecycle. The presence of European eel in all of the main catchments within the study area indicates there is suitable access into the catchments from the marine environment. Sticklebacks are tolerant of reduced oxygen conditions and very shallow water and do not have strong habitat preferences,

therefore they were considered likely to inhabit most stretches of watercourses across the study area.

9.3.125 The Afon Cafnan had the highest diversity of fish, with two species of conservation value present. The European eel receives protection via the Eels (England and Wales) Regulations 2009, is listed as critically endangered on the *Red List* [RD8] and is a species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. The brown trout is a species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016.

9.3.126 A number of migratory species, with freshwater life stages, are known from the adjacent coastal waters (appendix D13-4 Fish Surveys Report, Application Reference Number: 6.4.86):

- river lamprey (Lampetra fluviatilis);
- brown trout; and,
- Atlantic salmon (*Salmo salar*).

9.3.127 One river lamprey was recorded during 55 marine impingement surveys at the Existing Power Station between March 2011 and July 2012. Lamprey was also identified during the A5025 surveys in Afon Alaw and in historic records provided by NRW for the Afon Wygyr, to the east of the Wylfa Newydd Development Area. River lamprey is listed on Annex II of the Habitats Directive and in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. The watercourses within the Wylfa Newydd Development Area and wider Anglesey coastline are accessible to lamprey, although they were not observed within the field survey study area during freshwater fish surveys. Habitat conditions and the interconnectivity between habitats for different life stages are considered suboptimal for this species. As such, watercourses within the Wylfa Newydd Development Area do not represent a significant resource for river lamprey.

9.3.128 Atlantic salmon is also listed on Annex II of the Habitats Directive and in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. Salmon has been recorded from main watercourses to the west of the Wylfa Newydd Development Area (Alaw and Crigyll), and there are historical records in the 1990 impingement surveys (see appendix D13-4, Application Reference Number: 6.4.86) and a single Cofnod record [RD7] within the coastal waters adjacent to Cemlyn Lagoon. However, they have not been identified during the freshwater surveys. The freshwater environments are considered sub-optimal for juvenile salmon life stages.

9.3.129 Brown trout, a species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016, has been observed during the marine intertidal surveys and is known to migrate into freshwater environments, including the adjacent Wygyr catchment and the Crigyll catchment to the southwest.

9.3.130 The value of the fish receptors within the study area is considered to be high due to the presence of European eel and brown trout.

Summary of receptors

9.3.131 Only receptors of a low, medium or high value that would potentially be affected by construction activities associated with the Power Station, other on-site development, Marine Works and the Site Campus within the Wylfa Newydd Development Area are taken through to the impact assessment (see chapter B9, Application Reference Number: 6.2.9) with receptors of negligible value being scoped out of further consideration.

9.3.132 Also not included in this chapter are marine receptors that are features of designated sites as these are discussed in chapter D13 (Application Reference Number: 6.4.13), i.e. the Bae Cemlyn/Cemlyn Bay SAC (lagoon habitat), the Cemlyn Bay SSSI (terns) and the Morwenoliaid Ynys Môn/Anglesey Terns SPA (terns).

9.3.133 A summary of the value assigned to receptors is provided in table D9-5 below.

Table D9-5 Terrestrial and freshwater ecology receptors and assigned values

Receptor	Value
Tre'r Gof SSSI	High
Cae Gwyn SSSI	High
Cemlyn Bay SSSI	High
Bae Cemlyn/Cemlyn Bay SAC	High
Llyn Llygeirian SSSI	High
Glannau Ynys Gybi/Holy Island Coast SPA	High
Glannau Ynys Gybi/Holy Island Coast SAC	High
Corsydd Môn/Anglesey Fens SAC	High
Corsydd Môn a Llyn/Anglesey and Llyn Fens Ramsar	High
Llyn Dinam SAC	High
Glannau Aberdaron and Ynys Enlli/Aberdaron Coast Bardsey Island SPA	High
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal/Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands SPA	High
Craig yr Aderyn (Bird's Rock) SPA	High
Ancient woodland	High
Fungi	High
Freshwater fish	High
Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site	Medium
Trwyn Pencarreg Wildlife Site	Medium
Afon Wygyr Wildlife Site	Medium
Cors Cromlech Wildlife Site	Medium

Receptor	Value
Arfordir Trwyn y Buarth – Porth Wen Wildlife Site	Medium
Cors Cae-Owen Wildlife Site	Medium
Rhostir Mynydd Mechell Wildlife Site	Medium
Tir Gwlyb Teilia Neuadd Wildlife Site	Medium
Cors Mynachdy Wildlife Site	Medium
Lichen	Medium
GCN	Medium
Chough	Medium
Bats	Medium
Otter	Medium
Water vole	Medium
Red squirrel	Medium
Macroinvertebrates (individual ponds where species of higher conservation interest were located)	Medium
Terrestrial habitats	Low
Terrestrial invertebrates	Low
Common toad	Low
Adder and common lizard	Low
Breeding birds	Low
Over-wintering and passage birds	Low
Notable mammals (brown hare, hedgehog and polecat)	Low
Freshwater habitats	Low

Evolution of the baseline

9.3.134 The land use of the Wylfa Newydd Development Area is dominated by low-quality agricultural habitats of arable, improved grassland or poor semi-improved grassland. In the absence of the Wylfa Newydd Project, this is considered unlikely to change significantly over time. The only factors which are likely to change the predominant landscape are considered to relate to changes in the long-term economics of farming (which could be driven by changes in climate but are more likely to be influenced by farming policy), resulting in a change of land use.

9.3.135 There are a number of models covering the UK which simulate the possible change in climate. *The UK Climate Impact Programme* [RD25] indicates winters may become generally wetter and summers substantially drier for the whole of the UK. Data from *The National Assembly for Wales (2015)* [RD26] also suggest that there may be more variability from year to year, and the number of extreme years may increase e.g. more intense storms and severe

droughts. Over the medium and long-term these changes may affect terrestrial and freshwater receptor resources in the study area via changes in hydrology and land use.

9.3.136 Changes to coastal and marine processes arising through climate change are discussed in chapter D12 (Application Reference Number: 6.4.12). Such changes would influence coastal erosion and sea levels and so would affect the shingle ridge at Cemlyn Bay SSSI/SAC by encouraging a landward retreat, a flatter profile, and more frequent overtopping. In recognition of the long-term outlook, The Wales Coastal Group Forum (2011) Shoreline Management Plan 2 has recommended a number of management options, including managed realignment of the shingle ridge [RD27]. Although the assessment of effects to Cemlyn Bay SSSI/SAC is solely based on the Wylfa Newydd Project proposals, it is important to consider the long-term context of the site when determining any requirement for additional mitigation or monitoring.

9.4 Design basis and activities

9.4.1 This section sets out the design basis for this assessment of effects. It sets out where any assumptions have been made to enable the assessment to be carried out at this stage in the evolution of the design. This section also identifies the embedded and good practice mitigation that would be adopted to reduce adverse effects as inherent design features or by implementation of standard industry good working practice.

9.4.2 As described in chapter D1 (proposed development) (Application Reference Number: 6.4.1), the application for development consent is based on a parameter approach. The assessment described within this chapter has taken into consideration the flexibility afforded by the parameters. The principal ecological effects are related to the development footprint within the Wylfa Newydd Development Area and this is not affected by the Parameter Plans and Works Plans (Application Reference Number: 2.3). Consideration has also been given to the outputs of the air quality, noise and vibration, and surface water and groundwater assessments in relation to potential implications of the Parameter Plans and Works Plans (Application Reference Number: 2.3) for ecology. Each of those topic chapters has selected and assessed parameter conditions which represent a worst case for their respective topic chapters from the range of parameter variables presented in chapter D1 (Application Reference Number: 6.4.1). The environmental effects reported in this chapter are therefore representative of a worst case taking into consideration the parameters described in chapter D1 (Application Reference Number: 6.4.1).

Construction

Basis of assessment and assumptions

9.4.3 The assessment has been undertaken based on the design details and programme provided in chapter D1 (Application Reference Number: 6.4.1).

9.4.4 For ecology receptors, many of the key effects would occur during the vegetation removal and topsoil stripping phases as areas of habitat are

cleared. Once surface habitats have been removed from the site, most floral and faunal receptors within affected areas of the Wylfa Newydd Development Area would have been displaced or removed; as such, ongoing effects to many of the receptors identified would not arise following the initial site clearance works. However, all activities that could give rise to significant effects are identified and assessed.

9.4.5 Clearance works associated with Main Construction, Marine Works, the Site Campus and other on-site development, would affect approximately 276ha of the habitats within the Wylfa Newydd Development Area. Unless stated otherwise, the assessment of effects is based on an assumption that all vegetation, topsoil and other above ground features within the boundary of the temporary construction fencing would be completely removed before the onset of any other construction activity. Areas to be retained comprise the Tre'r Gof SSSI and buffer zones around it; a buffer zone alongside the boundary of Cae Gwyn SSSI; 15m buffer zones around both banks of the Afon Cafnan, Nant Caerdegog Isaf, Nant Plas Cemlyn, Nant Cemlyn, Nant Cemaes and the Tre'r Gof SSSI drains; and Dame Sylvia Crowe's Mound. The habitats within the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site would also be retained, with the exception of 1.1ha that would be affected during Main Construction. See the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) for these locations. Further information relating to these buffer zones is provided below.

9.4.6 Direct effects to riparian habitats would be limited to approximately 400m of the Nant Caerdegog Isaf that would be realigned, and approximately 200m of the Nant Porth-y-pistyll that would be lost to the footprint of a sediment pond. realignment of the section of Nant Caerdegog Isaf would be completed prior to the removal of the existing watercourse channel.

9.4.7 During the site clearance phase, there would not be any night working, and only the main site compound would be lit using passive infra-red, LED security lighting. Lighting across the site would be designed to meet the minimum standards required for health and safety only. Where lighting is used, light spill would be minimised as much as possible. Good practice mitigation would be delivered via the General Site Management Strategy in the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6). The potential for lighting during this phase to disturb the behaviour of nocturnal receptors would therefore be localised and limited.

9.4.8 The assessment for the effects of habitat loss takes into account the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). The overarching aim of the Strategy is to deliver a net biodiversity benefit by restoring, creating, enhancing and providing for the ongoing management of habitats within the Wylfa Newydd Development Area. Whilst it is anticipated the habitats developed through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) could result in a net gain in biodiversity across the Wylfa Newydd Development Area, conclusions over its effectiveness in reducing potential adverse effects on ecological receptors are precautionary to reflect the length of time such habitats would take to become fully established and offer maximum value.

Assumptions for noise assessment on ecology receptors

9.4.9 The level of information available relating to the tolerance of ecological receptors to noise disturbance varies across receptors. There is a paucity of published literature for some receptors (e.g. terrestrial mammals, including bats), whilst others are well-represented by published scientific literature (e.g. birds). Where previous studies exist, there are also often conflicting opinions regarding how different species or species groups will react to acoustic stimuli. In this chapter, breeding birds, over-wintering birds, chough, bats, otter, water vole, red squirrel, notable mammals and fish have all been identified as receptors with the potential to be affected by noise disturbance.

9.4.10 For the purposes of this assessment and based on the guidance used in chapter D6 (Application Reference Number: 6.4.6), disturbance significance thresholds for ecological receptors were set at the same level as for human receptors, unless otherwise stated within the assessment. This was set at a precautionary low level of 55dB, whereby all noise effects below 55dB are predicted to be negligible. In terms of precedent, this threshold level was also adopted on the North Blyth Biomass Power Station, as described in the *Stage 1 Shadow HRA report* for the project [RD28].

9.4.11 Baseline noise levels have not been collected for every location where a sensitive ecological receptor may be present. However, based on baseline information obtained from representative locations elsewhere, a general assumption has been made that daytime noise levels are generally in the range 40-48 dB $L_{Aeq,T}$, and night time levels are generally in the range 30-40 dB $L_{Aeq,T}$ (see section 6.3, chapter D6, Application Reference Number: 6.4.6).

Assumptions for air quality assessment on ecology receptors

9.4.12 Chapter D5 (Application Reference Number: 6.4.5) and Appendix D5-2 (Main Site Construction Phase Air Dispersion EIA - Final Modelling Report) (Air Quality) (Application Reference Number: 6.4.21), detail the predicted changes in mean annual and 24-hour atmospheric concentrations of oxides of nitrogen (NO_x), and in nitrogen and acid deposition at key ecological receptors. The figures cover two periods: the peak period for bulk earthworks, rock excavation, landform creation and MOLF construction in 2020; and the peak period for the Power Station construction in 2023. These assessment years represent year 2 and year 5 of the construction programme as described in chapter A2 (project overview and introduction to the developments) (Application Reference Number: 6.1.2). The modelling and assessment work (and selection of the two scenario years) has been undertaken on the basis of an assumed implementation year of the Wylfa Newydd Project of 2019.

9.4.13 Evidence from experiments indicates that 200µg/m^3 of NO_x may be an appropriate critical level for a 24-hour mean exposure. However, interactions between NO_x, sulphur dioxide (SO_2) and ozone (O_3) can affect the assimilation of NO_x by plants, and in the presence of concentrations of the latter compounds near or above their critical loads, 75µg/m^3 of NO_x is considered a more appropriate critical level [RD29].

9.4.14 Given the potential negative additive effects from NO_x when combined with concentrations of SO_2 and O_3, the levels of SO_2 and O_3 in the vicinity of the

Wylfa Newydd Development Area were investigated [RD30]. The investigation found that background levels of SO_2 and O_3 were low, and that further contributions of SO_2 from the combustion activity at the Wylfa Newydd Power Station were likely to be low also.

9.4.15 On the basis of these findings, and as agreed with NRW [RD31], a critical level of 200µg/m^3 is considered appropriate for the purposes of the assessment of NO_x impacts to sites without lichens and bryophytes. For sites with important lichen and bryophyte assemblages, such as the Tre'r Gof SSSI and the Cae Gwyn SSSI, a critical level of 75µg/m^3 of NO_x has been used.

9.4.16 For the assessment of air quality effects to designated sites, it is assumed that the average emissions from all relevant land-based plant comply with the EU Stage IIIB Non-Road Mobile Machinery (NRMM) emission standards i.e. the majority of plant manufactured from 2011 onwards.

Embedded mitigation

9.4.17 Some measures to address the potential effects on terrestrial and freshwater ecology have already been incorporated into the design of the Power Station, Site Campus and all other construction works and infrastructure within the Wylfa Newydd Development Area. These are known as embedded mitigation measures and have been taken into account in the assessment in section 9.5. Embedded mitigation will be secured through volume 2 of the Design and Access Statement (Power Station Site) (Application Reference Number: 8.2.2), the Main Power Station Site sub-Code of Construction Practice (sub-CoCP) (Application Reference Number: 8.7), and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Embedded mitigation of relevance to this assessment is summarised below.

9.4.18 The drainage design detailed in the Landscape and Habitat Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.16) would reduce potential effects on receiving water bodies and ecological receptors, most notably the Tre'r Gof SSSI and the Cae Gwyn SSSI. Full details are provided in chapter D8 (Application Reference Number: 6.4.8) and appendix D8-8 Summary of preliminary design for construction surface water drainage (Application Reference Number: 6.4.33). Drainage from the construction areas and the landscape mounding works would be via sediment settlement lagoons and other water treatment facilities as required, to reduce total suspended solids concentrations to below 70mg/l during a 1 in 1-year storm event; final discharge standards would be implemented in accordance with the approved Environmental Permit.

9.4.19 The drainage design has incorporated the following features for the Tre'r Gof SSSI (see appendix D8-8 (Application Reference Number: 6.4.33) for further details):

- The use of a permeable drainage blanket made up of inert rock material beneath Mound A to the south and east of the Tre'r Gof SSSI. This would allow the shallow groundwater and surface water runoff flowing from the south and east of Mound A to flow under the mound into the SSSI as it

currently does. The use of inert rock would seek to ensure that the shallow groundwater chemistry did not change appreciably from the baseline conditions.

- The use of overflow pipes at intervals in the drainage ditch to the north and west of Mound A. This would mean that during times of higher rainfall, water would flow from the ditch to the ground adjacent to the drain, allowing overland flow to the SSSI to be maintained. Monitoring and control weirs in the overflow pipes would be used to control the flow to the SSSI.
- The drainage system has been designed to incorporate as much flexibility as possible so that changes can be made to drainage water treatment and to the volume of water being released at various discharge points during the construction period.

9.4.20 In choosing the location of compounds, the distance to noise-sensitive receptors (e.g. bat barns, chough nesting sites) has been taken into account so that stand-off distances between noise sources and receptors are increased as far as reasonably practicable.

9.4.21 The watercourse realignment (see figure D9-6 (Application Reference Number: 6.4.101) and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16)) has been designed to provide habitats of greater value than the existing section by improving sinuosity and enhanced riparian planting. The phasing would allow maturation so that there would be no habitat fragmentation caused by the stream realignment.

9.4.22 Areas within the Wylfa Newydd Development Area not required as hardstanding following Main Construction would be landscaped and restored to an appropriate land use and, wherever practicable, to an enhanced ecological condition to that prior to construction. These landscaped and restored areas would be planted with native species and species-rich hedgerows.

9.4.23 Foul water discharge would be to an existing Dwr Cymru Welsh Water sewage treatment works and to on site package treatment plants. Foul water would not be discharged to the surface water environment.

Good practice mitigation

9.4.24 The good practice mitigation detailed below would be secured through the Wylfa Newydd CoCP and the Main Power Station Site sub-CoCP (Application Reference Numbers 8.6 and 8.7 respectively).

9.4.25 Pre-construction surveys would be completed before works affecting habitats potentially suitable for protected species, and where the results of baseline surveys require updating. This would be in accordance with the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), and as a DCO requirement, Draft Development Consent Order (Application Reference Number: 3.1). Pre-construction surveys would inform the need for and/or the detail contained within protected species licence applications. The results would also inform

construction decisions e.g. the micro-siting of ditch crossings to avoid water vole burrows. The provision of up to date (season before impact) information is standard practice for developments.

9.4.26 Good practice mitigation would address any effects on protected species within the Wylfa Newydd Development Area to meet the requirements of relevant legislation, as per the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number 8.7). Full details are set out within the Draft Bat Mitigation Licence and Draft Great Crested Newt Mitigation Licence method statements (see appendices D9-20 and D9-21. Application Reference Number: 6.4.53 and 6.4.54) and Draft Water Vole Conservation Licence method statement (see appendix D9-19, Application Reference Number: 6.4.52). These licences would be issued by NRW.

9.4.27 To secure an EPSML, the details within the licence applications must satisfy NRW that the activity authorised would not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status within their natural range (Regulation 55(9)(b) Conservation of Habitats and Species Regulations 2017). To secure a conservation licence for water vole, NRW must be satisfied that there is a local conservation benefit for the species. Mitigation proposals for all licences would be in accordance with the respective good practice guidance documents ([RD18]; [RD32]; [RD33]; [RD1]). Once granted, all works would be undertaken in accordance with respective licences.

9.4.28 Monitoring would be undertaken of species translocations, habitat creation and work undertaken as part of a protected species licence to assess efficacy of mitigation provided, such as chough habitat enhancement. In relation to the Wylfa Newydd Development Area, this is likely to be no greater than 2yrs of monitoring, according to the relevant guidance, although monitoring commitments would be undertaken in line with the requirements of the relevant protected species licence.

9.4.29 No works would take place within the Tre'r Gof SSSI or the Cae Gwyn SSSI boundaries (although see one exception, below). To protect the Tre'r Gof SSSI and the Cae Gwyn SSSI from topsoil stripping and other construction related activities, buffer zones would be implemented. These buffer zones would reduce effects on the habitats of the SSSIs from those likely to occur as a result of being adjacent to construction works (e.g. small-scale runoff or fugitive dust deposition) and would seek to ensure the avoidance of actions that would prevent the SSSIs from achieving favourable condition. Where practicable, no storage areas, vegetation clearance or construction would take place within the SSSI buffer zones. Where unavoidable small scale work is required to be undertaken within SSSI buffer zones, detailed methodologies and risk assessments would be developed by Horizon to ensure those works can be undertaken without adversely affecting the designated areas or their interest features. Methodologies and risk assessments for the small-scale works would be agreed with NRW prior to commencement. Small scale works might comprise the installation of appropriate types of fencing, vegetation management, or monitoring surveys. The buffer zones are outlined below, as described in the Ecology and Landscape Management Strategy and the

Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number 8.7):

- For the north and west of the Tre'r Gof SSSI adjacent to the Site Campus, the buffer zone would be 20m.
- To the south of the Tre'r Gof SSSI, the buffer zone would be 50m.
- For the more sensitive eastern end of the Tre'r Gof SSSI, the buffer zone would be 100m.
- At the Cae Gwyn SSSI, there would be a 15m buffer zone along the boundary ditch of the SSSI, separating construction activities from the designated habitats.
- Buffers around bat barns would be a minimum of 10m. Appropriate planting within this zone is required. This will be a hard buffer, with no works within it. The screening along the buffer zone will be proportionate to the potential noise and disturbance effects anticipated. Construction activities in areas adjacent to the buffer will reduce noise and visual disturbance, as far as practicable. These requirements apply to the two existing bat barns as well as the two barns currently under construction.

9.4.30 The Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) and the Wylfa Newydd CoCP (Application Reference Number: 8.6), sets out the overarching pollution management principles to be applied throughout the construction period. Good practice mitigation during construction would include the following guidance on pollution control and relevant Construction Industry Research and Information Association (CIRIA) guidance on good construction practice:

- Control of Water Pollution from Construction Sites. Guidance for consultants and contractors (C532) [RD34];
- Environment Alliance Pollution Prevention Guidelines (PPG), in particular PPG01, PPG05, PPG06 and PPG13 ([RD35]; [RD36]; [RD37]; [RD38]);
- Environmental good practice on site guide (fourth edition) (C741) [RD39];
- The SuDS Manual (C753) [RD40];
- Environmental Handbook for Building and Civil Engineering Projects (3 Parts) (C512, C528, C529) [RD41]; [RD42]; [RD43];
- Land use management effects on flood flows and sediment – guidance on prediction (C719D) [RD44];
- Development and flood risk – guidance for the construction industry (C624) [RD45]; and
- Culvert Design and Operating Guide (C689) [RD46].

9.4.31 In line with CIRIA Guidance C741, *Environmental good practice on site guide* [RD39], buffer zones would be established adjacent to watercourses. This

would protect watercourses and associated receptors (e.g. bats, water vole, otter, fish, freshwater habitats) from the effects of water quality change and disturbance arising through construction activity, as per the Surface Water and Groundwater Management Strategy contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). The buffers would be as follows:

- A 15m buffer zone along the Nant Cemlyn and Nant Cemaes where the watercourses cross the Wylfa Newydd Development Area;
- A 15m buffer around watercourses draining into the Tre'r Gof SSSI;
- A 15m buffer zone along the Afon Cafnan and its main tributary (Nant Caerdegog Isaf). For the watercourse realignment works on the Nant Caerdegog Isaf a risk assessment method statement approach would be undertaken with relevant approval and consents for works from NRW;
- For other watercourses, which include drainage ditches, existing culverted watercourses, field drains and ponds within the Wylfa Newydd Development Area, no general buffer zone would exist and construction would be undertaken in accordance with good practice measures as set out in the Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

9.4.32 The necessary consents for working in proximity to watercourses would be obtained, as required.

9.4.33 Further detailed information relating to the protection of surface water and groundwater is provided in chapter D8 (Application Reference Number: 6.4.8).

9.4.34 Adherence to good practice mitigation would be monitored in accordance with the measures set out in the Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), which also defines the pollution management measures to be applied throughout the construction period. The construction principal contractor would implement the strategies as required by the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). The document provides guidance for contractors to plan safe methods of working that avoid incidents of sediment release into watercourses and would provide a pathway for reporting environmental pollution incidents and outline containment and remediation strategies for potential scenarios that could occur during the construction period.

9.4.35 Appropriate standards and measures regarding dust and air quality management would be adhered to, including measures such as dust suppression on haul roads and implementation of appropriate controls on emissions from construction plant [RD47]. Buildings within 50m of sensitive ecological receptors would be soft-stripped before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). These measures are contained within the Air Quality Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) and the Wylfa Newydd CoCP (Application Reference

Number: 8.6), (also see chapter D5 for further information) (Application Reference Number 6.4.5).

9.4.36 In addition to the good practice measures set out above, the Air Quality Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) outlines site-specific monitoring at the Tre'r Gof SSSI and the Cae Gwyn SSSI to determine the potential for harm via dust deposition before and during the construction period (also see appendix D5-1 Construction Dust Assessment – Main Construction, Application Reference Number: 6.4.20). Coupled with the dust deposition monitoring, these would be used to directly determine if dust soiling is causing significant effects to the vegetation within each site and identify if further action is required to prevent further dust deposition or damage to the vegetation. This would be achieved via additional mitigation, management within areas under Horizon control or alteration of the dust causing activities. These inspections could be extended to the other ecological sites of lower sensitivity, should there be concern that dust deposition was having an adverse effect at sites such as the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site or Trwyn Pencarreg Wildlife Site and ancient woodland.

9.4.37 Throughout the construction period, there would be activities that require the provision of suitably qualified and experienced personnel. For example, an Ecological Clerk of Works (ECoW) would monitor that the works proceed in accordance with good practice guidance and adhere to the mitigation measures as outlined here. The ECoW would also be integral to the delivery of many of the targeted additional mitigation strategies for species/groups described later in this document. This is detailed within the Wylfa Newydd CoCP (Application Reference Number: 8.6), and the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

9.4.38 The Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) would also ensure that buffer zones would be created around the Tyn-y-Maes bat barn, the Cafnan Farm Wildlife Tower and the two bat barns currently under construction (two new bat barns form part of the good practice mitigation proposals below). These zones would be a minimum of 10m in width and demarcated by fencing and/or planting, depending on location. The screening along the buffer zones would be proportionate to the potential noise and disturbance effects anticipated. There would be no construction works within the buffer zones. Construction activities in areas adjacent to the buffer would reduce noise and visual disturbance, as far as practicable, in line with the requirements of the Noise and Vibration Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). These buffer zones would protect retained features from effects likely to occur as a result of being adjacent to construction works (e.g. noise and light disturbance), and would seek to ensure the efficacy of existing mitigation and the conservation status of bats within the local area are not compromised.

9.4.39 To reduce effects on ecological receptors at particularly sensitive times of the year when effects could have proportionately greater effects on conservation status, the following would be implemented via the Wylfa Newydd CoCP

(Application Reference Number: 8.6), and as a DCO requirement, Draft Development Consent Order (Application Reference Number: 3.1):

- If practicable, hedges and scrub with the potential to support bird nests would not be removed during the breeding bird season (March to August inclusive). If it was not possible to avoid the breeding bird season, works would be supervised by an ECoW, with appropriate protection measures put in place should active nests be found. These would include exclusion zones around active nests until chicks had fledged or nests become inactive as determined by monitoring by the ECoW;
- Notable mammal species predominantly give birth in the period between March and August and so would be protected by the good practice mitigation designed to protect breeding birds. However, brown hare can give birth as early as February, and hedgehog can have a late birthing peak in September [RD20]. An ECoW would therefore supervise clearance of habitats with high potential to support juvenile or pregnant brown hare and hedgehog in February and September (respectively);
- If pre-construction surveys confirm the presence of active red squirrel dreys within, or immediately adjacent to trees that would be felled, felling works would be delayed to avoid the period when pre-weaned young are present (potentially mid-February to mid-September) [RD48];
- Habitat with the potential to support hibernating reptiles would not be removed between November and March. This would reduce the risk of killing or injuring these animals at a time when they are vulnerable and unable to move away from sources of danger, and would therefore reduce the risk of committing an offence under the legislation protecting these animals;
- Habitat with the potential to support hibernating reptiles, amphibians and hedgehogs would not be removed between November and March without supervision by the ECoW. This would also reduce the risk of killing or injuring these animals; and
- Retained sensitive areas would be fenced off from potentially damaging or disturbing works.

9.4.40 In order to mitigate the risk of disturbing any Schedule 1 bird species nest, the following approach would be taken, secured the Wylfa Newydd CoCP (Application Reference Number: 8.6):

- Habitats with the potential for use by Schedule 1 bird species will be identified and surveyed by the ECoW prior to site clearance.
- In the event that a Schedule 1 bird species is found during the nesting season, NRW will be consulted in order to identify and agree appropriate measures to be undertaken in respect of that species.
- Should a Schedule 1 species be discovered within an area to be disturbed, Horizon would implement the general measures set out above for birds with the added requirement that any Schedule 1 species or its

dependent young must not be disturbed while at or building a nest. Additional exclusion/protective measures may be required.

- It is noted that there is no legal provision under the Wildlife and Countryside Act 1981 (as amended) to obtain a licence to facilitate development which would disturb a Schedule 1 species.

9.4.41 A mitigation strategy for adder and common lizard would be in place throughout habitat clearance, as outlined in the Wylfa Newydd CoCP (Application Reference Number: 8.6). This would include trapping and translocation of individuals, phased and directional habitat manipulation, sensitive removal of suitable refuge features (e.g. dry stone walls and cloddiau), and supervision of works by an ECoW. The strategy would be informed by species records from the Wylfa Newydd Development Area and the presence of suitable habitats at the time of clearance, e.g. rank grassland. Trapped animals would be released in an area of habitat shown on figure D9-8 (Application Reference Number: 6.4.101). This area has been secured by Horizon for 15 years, which is designed to cover the full Project construction period and, although considered unlikely, Horizon would seek to extend this if necessary. The receptor area would also benefit terrestrial invertebrates, common toad, GCN, breeding birds, over-wintering and passage birds, bats, and protected and notable mammals. The mitigation strategy would prevent the death and injury of adder and common lizard and ensure the works would not undermine the conservation status of adder and common lizard in the local area.

9.4.42 A fish rescue would be carried out during the removal of freshwater habitat, such as the realignment of Nant Caerdegog Isaf (watercourse 13). Fish rescue would require a licence from NRW and authorisation under the Salmon and Freshwater Fisheries Act 1975. Fish would be returned to suitable habitat on the same waterbody unaffected by the works. No fish would be moved between waterbodies. The mitigation strategy would mitigate the death and injury of fish and ensure the works would not undermine the conservation status of valued species of fish in the local area.

9.4.43 To prevent the introduction and spread of plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (and any other relevant pernicious species not listed), a Biosecurity Risk Assessment and Method Statement, within the Wylfa Newydd CoCP (Application Reference Number: 8.6), sets out how areas with the presence of Schedule 9 plant species will be demarcated, and how the contaminated materials would be appropriately managed throughout the works. This includes details of appropriate disposal, and how the transfer of viable propagules of invasive non-native species by people or vehicles would be prevented. Prior to any workers going out on site, a tool-box talk from an ECoW experienced in identifying invasive non-native plant species would be provided, including photographs of the invasive non-native plant species known to be present on a site. Stands of invasive non-native plant species suspected to be present in areas outside of those already known would be reported as soon as is practicable so that the appropriate actions can be applied from the biosecurity risk assessment. This would avoid actions that would compromise the favourable conservation status of designated sites and sensitive freshwater and terrestrial habitat receptors.

9.4.44 To facilitate the safe passage of animals away from the Wylfa Newydd Development Area and to reduce the effects of habitat severance, boundary fencing would be permeable to mammal movement.

9.4.45 The Landscape and Habitat Management Strategy (Application Reference Number: 8.16) has been developed to provide biodiversity enhancements within the Wylfa Newydd Development Area and enhance ecological connectivity. Planting works would be scheduled to recreate areas of habitat as soon as practically possible, starting during the construction period, thereby reducing periods of temporary habitat loss.

Operation

Basis of assessment and assumptions

9.4.46 Commissioning and operation of the Power Station is scheduled to last 60 years. The assessment assumes that the Wylfa Newydd Development Area during the first year of operation would be as shown by the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.4.47 Potential effects due to operational activities could arise through disturbance (noise, light and recreation) and changes to air and water quality.

9.4.48 At the operational stage, the drainage system would be transitioned from the actively managed system during construction to a more natural system. This would include removal of all active treatment systems. However, the ditches/swales created for drainage for the construction works around the landscape mounds would remain for the operational phase with the discharge points remaining the same. Settlement ponds would remain but there would be no active treatment of the discharge. The concept design for surface water in the landscaped areas post-construction is contained in appendix D8-8 (Application Reference Number: 6.4.33).

9.4.49 The effects of construction of the spent fuel storage buildings would be limited to temporary disturbance (noise and vibration, lighting or visual) and hydrological changes during its construction.

Embedded mitigation

9.4.50 Embedded mitigation described in chapter D8 (Application Reference Number: 6.4.8) is of relevance to terrestrial and freshwater ecology receptors, notably aquatic habitats and species, and wetland designated sites. As described in chapter D8 (Application Reference Number: 6.4.8), embedded mitigation measures incorporated for the operational stage include the following, which would be secured through the Wylfa Newydd CoCP (Application Reference Number: 8.6), and volume 2 of the Design and Access Statement (Application Reference Number: 8.2.2):

- Foul water discharge will be to the existing DCWW Sewage Treatment Works and to on site package treatment plants. Foul water would not be discharged to the surface water environment. The effects of this drainage discharge are considered in chapter D13 (Application Reference Number: 6.4.13).

- The spent fuel storage buildings and radioactive waste storage and processing facilities would be constructed within the Power Station Catchment, and would be sited a minimum of 15m away from any watercourse. These storage facilities would be designed and built with a very high level of engineering containment to prevent the release of any radiological contaminants to the surface water and groundwater environments.
- All hydrocarbon fuel, oil (including waste oil) and chemical storage areas would be within the Power Station Site. Appropriate controls would be in place to prevent the discharge of contamination to surface waters in the event of a spill or leak. As such, there would be no pathway to the surface water environment.

Good practice mitigation

9.4.51 Chapter D10 Landscape and visual (Application Reference Number: 6.4.10) and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) describe good practice mitigation with respect to the landscape design. The design of the landscaping and associated habitat has been significantly influenced by the important receptors present within the Wylfa Newydd Development Area.

9.4.52 The provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) aim to mitigate the effects of habitat loss and fragmentation associated with construction by enhancing the habitats within the Wylfa Newydd Development Area. The proposed habitat creation would connect existing habitats in the wider landscape to facilitate the movement of species back into the Wylfa Newydd Development Area on completion of the construction phase. The long-term management of these habitats throughout the operational period would also be delivered through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) which would seek to ensure that the habitats are appropriately managed in accordance with the aim of achieving a net biodiversity benefit.

9.4.53 To adequately protect aquatic habitats and species, and wetland designated sites, good practice mitigation with respect to drainage would be implemented as described in chapter D8 (Application Reference Number: 6.4.8) and the Surface Water and Groundwater Management Strategy contained within the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13), as summarised below:

- Surface water drainage would discharge to the sea. Surface water drainage from all roads, car-parking areas or other areas of hardstanding where there is the potential for leaks of fuels, oils or other liquids would incorporate appropriate pollution treatment, such as oil separators.
- After construction, the mound drainage would be converted to a passive drainage system which would require no maintenance. Appropriate attenuation would be provided to prevent any increases to flood risk off-

site, including swales and other features to try to match current surface water flows and groundwater recharge.

- The Surface Water and Groundwater Management Strategy within the Wylfa Newydd CoOP (Application Reference Number: 8.13) sets out the overarching pollution management principles to be applied throughout the operation of the Power Station.

Decommissioning

Basis of assessment and assumptions

9.4.54 Decommissioning would be carried out in distinct phases (see chapter D1) (Application Reference Number: 6.4.1):

- There would be an initial phase of approximately 20 years during which the bulk of decommissioning would take place. At the end of this period, all Power Station structures except for the spent fuel storage buildings and their support facilities would have been decommissioned and demolished and the land remediated and de-licensed.
- A subsequent longer period, between 75 and 120 years (to allow for an appropriate cooling period), during which the only facilities on site would be the spent fuel storage buildings and ILW stores. During the cooling period, it is assumed that activities would be consistent with those during operation, except with fewer personnel and associated disturbance.
- The construction and operation (for an approximate 10-year period) of a facility to repackage spent fuel from its interim storage casks to canisters suitable for transport and final disposal.
- Demolition of the repackaging facility and the spent fuel storage buildings (around a year). Demolition activities would generate effects consistent with those undertaken during Main Construction, although these would be localised to the remaining buildings and associated compounds and access routes only.
- Remediation and de-licensing of the remainder of the site (around a year).

9.4.55 The effects of decommissioning would be similar to those experienced during construction with potential to affect terrestrial and freshwater ecology receptors.

Embedded mitigation

9.4.56 It is anticipated that embedded mitigation for decommissioning the Power Station would be similar to that implemented during construction, particularly with respect to the protection of designated wildlife sites and surface water and groundwater quality.

Good practice mitigation

9.4.57 Good practice mitigation would adhere to relevant guidelines and standards applicable at the time. It is expected that this would be consistent with those measures outlined above for construction and operation. The implementation of mitigation strategies would be in accordance with relevant good practice guidelines and would seek to avoid undermining the conservation status of the respective receptors at the local level.

9.4.58 It is anticipated that areas of the Wylfa Newydd Development Area that would be affected by decommissioning of the Power Station would be landscaped and restored primarily to sympathetically managed agricultural land. There would be a focus on habitat enhancement through the creation of species-rich habitats that contribute to the contemporary local biodiversity targets and that would be of value for the important species receptors present. New habitats would seek to provide connectivity to the wider landscape. All planting proposed would be appropriate for the prevailing conditions, of local provenance and cultivated within the UK. This would be secured through a DCO requirement, Draft Development Consent Order (Application Reference Number: 3.1).

9.5 Assessment of effects

9.5.1 This section presents the findings of the assessment of effects associated with the construction, operation and decommissioning of the Power Station, Site Campus, Marine Works and other on-site development.

Construction

Pathways to effects

9.5.2 Terrestrial and freshwater ecology receptors across the study areas may potentially be affected during construction activities via a number of pathways, as outlined in table D9-6 and the paragraphs below.

Table D9-6 Summary of pathways for environmental changes during construction to affect ecological receptors

Potential effect	Area in which the effects may influence ecological receptors	Ecological receptors potentially affected
Mortality and injury of species	Physical interaction between species and project infrastructure, machinery or activities would be limited to areas within the Wylfa Newydd Development Area only.	Terrestrial invertebrates Great crested newt Common toad Adder and common lizard Breeding birds Over-wintering and passage birds Bats Water vole Red squirrel Notable mammals Macroinvertebrates Freshwater fish
Habitat loss/gain, fragmentation or modification	Habitat loss/gain would be restricted to areas cleared to make way for Main Construction, Marine Works and the Site Campus within the Wylfa Newydd Development Area. There would be no additional habitat loss during operation (with the exception of construction of the spent fuel storage buildings). Retained habitats within the Wylfa Newydd Development Area would temporarily be fragmented from the wider landscape between the period when clearance works commence and habitat reinstatement and creation are completed. Habitats between the Wylfa Newydd Development Area and the sea would also be isolated during the	Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site Ancient woodland Terrestrial habitats Fungi Lichen Terrestrial invertebrates Great crested newt Common toad Adder and common lizard Chough

Potential effect	Area in which the effects may influence ecological receptors	Ecological receptors potentially affected
	construction period by activities associated with Main Construction, the Marine Works and the Site Campus e.g. habitats at Wylfa Head. Habitats outwith the construction footprints may be modified due to changes to air or hydrology and these are discussed below. Habitats outwith the construction fencing may be affected by habitat degradation e.g. trampling and erosion, caused by worker pressure.	Breeding birds Over-wintering and passage birds Bats Otter Water vole Red squirrel Notable mammals Freshwater habitats Macroinvertebrates Freshwater fish
Species disturbance (from changes to noise, vibration, visual and light stimuli)	The area subject to noise disturbance varies based on the activity being undertaken and the sensitivity of the individual receptor. All potentially sensitive receptors within the area likely to be exposed to noise level changes have been considered. Consideration was given to the effects of visual disturbance for all potentially sensitive receptors within 300m of the Wylfa Newydd Development Area. This was based on the work carried out by Cutts *et al.* [RD49] and using professional judgement. The effects of lighting were considered for areas within or adjacent to the Wylfa Newydd Development Area that are potentially used by sensitive species (Appendix D10-10. Environmental Lighting Impact Assessment. Application Reference Number: 6.4.67).	Terrestrial invertebrates Adder and common lizard Chough Breeding birds Over-wintering and passage birds Bats Otter Water vole Red squirrel Notable mammals Freshwater fish

Potential effect	Area in which the effects may influence ecological receptors	Ecological receptors potentially affected
	Species outwith the construction fencing may be affected by disturbance caused by worker pressure.	
Air quality changes (resulting in habitat loss/modification)	All sensitive receptors within 50m for the effects of dust; 200m for the effects of traffic emissions; and 2km for emissions from construction plant, machinery and marine vessels (increased to 15km for European Designated Sites).	Statutory and non-statutory designated wildlife sites Ancient woodland Lichen Fungi
Hydrological changes (resulting in mortality/injury of species and/or habitat loss/modification)	All sensitive receptors with hydrological connectivity to an affected waterbody.	Statutory and non-statutory designated wildlife sites Breeding birds Over-wintering and passage birds Otter Water vole Freshwater habitats Macroinvertebrates Freshwater fish
Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification)	All areas directly affected by construction activities. Areas outwith the Wylfa Newydd Development Area may also be affected if contaminated vehicles, machinery, or spoil is introduced. Sensitive receptors with hydrological connectivity to contaminated areas may also be affected.	Statutory and non-statutory designated wildlife sites Terrestrial habitats Freshwater habitats

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Mortality and injury of species

9.5.3 During the construction phase, the following activities could result in mortality and injury of species receptors:

- vegetation clearance;
- topsoil clearance;
- demolition of buildings;
- removal of other above ground features (e.g. walls and cloddiau);
- watercourse diversion;
- construction of culverts;
- drainage installation;
- installation of construction site boundary/security fences; and
- utilities diversions.

9.5.4 A secondary potential source of mortality or injury of species comes from collision with construction related traffic on roads supplying construction activities within the Wylfa Newydd Development Area, particularly for species such as brown hare and hedgehog. However, the overall increase in traffic is considered to be minor (chapter C2 Traffic and transport, Application Reference Number 6.3.2), and the potential for effects is so low that a specific assessment for this pathway has not been undertaken.

Habitat loss/gain, fragmentation or modification

9.5.5 Construction works would take place over approximately 92% of the Wylfa Newydd Development Area with approximately 276ha of terrestrial habitat being directly affected by the works, primarily through vegetation and topsoil clearance.

9.5.6 Habitat fragmentation would result from the widespread loss of terrestrial habitat through vegetation and topsoil clearance, as well as activities such as installation of site boundary and security fences, installation of drainage and services, and construction of culverts, haul roads and bridges.

9.5.7 Freshwater habitat would be affected locally due to watercourse diversions, construction and excavation of culverts, construction of bridges and drainage installation; installation of culverts, outfalls, bridges (including piers); and any channel realignments which would potentially require in-channel working. This could disturb existing channel bed forms (such as pools, riffles, depositional features) and bank structure, removing, modifying or degrading in-stream habitat. This could also include temporary removal of riparian habitat and floodplain connectivity due to construction activities. Nine ponds would also be removed during topsoil stripping.

9.5.8 Habitat degradation could occur to retained terrestrial and freshwater habitat within and adjacent to the Wylfa Newydd Development Area. Hydrological changes resulting from vegetation clearance, topsoil clearance, associated drainage installation, construction of culverts, dewatering, earthworks and excavation activities could lead to long-term changes in the ecological

composition of hydrologically dependent habitats. Hydrological effects are addressed in chapter D8 (Application Reference Number: 6.4.8). Increased visitor numbers on retained terrestrial habitat, notably the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, could result from the use of these sites from recreation by workers residing in the Site Campus. This could lead to habitat degradation through vegetation trampling and soil compaction. Effects on Tre'r Gof SSSI were not assessed despite being in close proximity to the Site Campus as the habitats present offer no amenity function and do not have open access. The potential effects on all other receptors were considered to be negligible.

9.5.9 Changes in air quality due to dust and emissions of NO_x and SO_x from plant, machinery and shipping could also result in habitat degradation (see chapter D5, Application Reference Number: 6.4.5). Indirect effects, such as the reduction in quality of habitat for other receptors reliant upon it may also occur (e.g. chough foraging habitat at Wylfa Head).

9.5.10 During construction of the Power Station, the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would be implemented and the recreation and enhancement of habitats programmed as soon as practicable thereby reducing the duration of habitat loss and fragmentation. This would bring benefits to species previously displaced by vegetation clearance through re-establishing links within the wider landscape and creating replacement foraging and shelter habitats. Habitats proposed for restoration, creation and enhancement through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) include species-rich grassland, marshy wet grassland, woodland, coastal heath/grass mosaic, and hedgerow. In addition, stone walls would be created using original material retained following site clearance works. Further details are provided in the assessment of terrestrial habitats below.

Species disturbance (from changes to noise, vibration, visual and light stimuli)

9.5.11 Species disturbance effects could result from changes in noise, vibration or visual stimuli during construction activities (such as soil-clearance, blasting, drilling, earthworks, watercourse diversion, excavation, building demolition and security fence installation).

9.5.12 There could also be disturbance effects as a result of workers at the Site Campus using areas outside of the construction boundary for recreation e.g. in habitats at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, and the potential disturbance to chough that breed and forage in this area.

9.5.13 Chapter D6 (Application Reference Number: 6.4.6) assesses the effects of changes in noise and vibration. However, many of the most disturbing activities would occur after the completion of vegetation and topsoil clearance and so most terrestrial species receptors would have been displaced from the Wylfa Newydd Development Area. As such, disturbance would be limited to receptors in adjacent and retained habitats, or to receptors that may still be

present within the Wylfa Newydd Development Area following its clearance (e.g. foraging chough or roosting bats in retained structures).

9.5.14 The typical average noise levels anticipated to be generated by the construction works have been modelled with the results compared against the existing baseline conditions (see chapter D6, Application Reference Number: 6.4.6). As the effects of the works assessed in this chapter apply only to receptors in the terrestrial environment, only noise transmitted via the air is considered.

9.5.15 The assessment of noise effects uses as its primary measure the worst case noise levels averaged over the duration of each phase of the construction period (see chapters B6 and D6) (Application Reference Number: 6.2.6 and 6.4.6). For the purposes of this assessment, and based on the guidance used in chapters B6 and D6 (Application Reference Number: 6.2.6 and 6.4.6), noise disturbance significance thresholds for ecological receptors were set at the same level as for human receptors (see section 9.2).

9.5.16 Visual effects resulting in potential disturbance could occur as a result of the re-routing of public footpaths in the local area, potentially causing avoidance of areas by species previously subject to lower levels of recreational disturbance.

9.5.17 Lighting disturbance effects are most likely to affect nocturnal receptors such as fish, bats and otter.

Air quality changes

9.5.18 Air quality changes could occur through fugitive dust and changes in pollutant levels caused by construction plant activities and increased traffic in and around the Wylfa Newydd Development Area. The air quality assessment is presented in chapter D5 (Application Reference Number: 6.4.5) (although see chapter C4 (Application Reference Number: 6.3.4) for the project-wide assessment relating to air quality and traffic).

9.5.19 Retained terrestrial and freshwater habitat receptors may be affected through changes in air quality as the plant communities they support may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust or via changes to chemical composition of soils or watercourses arising from deposition of acid or nutrients.

9.5.20 The deposition of nitrogen and acidic compounds may affect the flora of the study areas, including lichen. Species of flora and lichen that are adapted to live in substrates with low nutrient levels could be outcompeted by faster-growing species. This could result in populations being dominated by low numbers of generalist species, rather than diverse assemblages of specialists. The chemical composition of the substrates on which sensitive flora or lichen grow could also be changed. Lichens in particular are very sensitive to changes in pH, and both diversity and abundance could be negatively affected through air quality changes.

Hydrological changes (including water quality and quantity)

9.5.21 Hydrological changes are detailed in chapter D8 (Application Reference Number: 6.4.8) and include changes to both water quality and quantity within nearby watercourses and wetland areas. Changes in hydrology, fluvial geomorphology and hydrogeology are important in the context of terrestrial and freshwater ecology due to the following factors:

- water quantity has an important role in structuring the flora and fauna communities in watercourses, ponds and wetlands;
- sediment and other pollutant releases have the potential to adversely affect sensitive ecological receptors; and
- ecological receptors can be sensitive to modification of runoff regimes changing the quality of surface and groundwater.

Introduction and spread of invasive non-native plant species

9.5.22 Any introduction or spread of Invasive Non-native Species (INNS) would potentially cause significant adverse effects to sensitive habitats due to the dominance that INNS can have over native species.

9.5.23 During the construction works, substantial amounts of topsoil and subsoil would be moved around the Wylfa Newydd Development Area. There is therefore the potential for INNS to be introduced or spread via contaminated machinery or soil. There is also a risk of transferral from pedestrian movement and worker vehicles.

Receptor-based assessment

Tre'r Gof SSSI

9.5.24 The potential for significant effects on the Tre'r Gof SSSI have been identified via the following pathways:

- habitat loss, fragmentation or modification;
- air quality changes;
- hydrological changes; and
- introduction and spread of INNS.

Habitat loss and fragmentation

9.5.25 There would be no direct habitat loss within the SSSI as a result of the Wylfa Newydd Project.

9.5.26 Fragmentation effects as a result of construction activities (i.e. Main Construction and construction and operation of the Site Campus) are not considered likely. This is due to the designated habitats within the SSSI already being isolated from other areas with the potential to support a similar botanical assemblage. Therefore, there would be no risk of severing links with similar habitats nearby.

9.5.27 Habitat modification (excluding effects from air quality and hydrological changes) are not predicted as the management regime currently in operation for the SSSI would be maintained, including grazing within the livestock fencing surrounding the SSSI.

9.5.28 The SSSI would be almost entirely surrounded by construction activity and so, in the absence of mitigation, this may result in degradation of the habitats on the boundary of the site, e.g. due to littering, fugitive dust and changes to runoff regimes (the latter two are discussed separately, below).

9.5.29 To lessen this potential effect, good practice mitigation would include a buffer zone around the entirety of the SSSI, formed by a fence erected to provide extra livestock grazing areas. An additional buffer zone outside the livestock fence would be included on the southern, northern and eastern sides of the SSSI to protect the sensitive near surface flows which support the designated features of the SSSI (see chapter D8, Application Reference Number: 6.4.8). Where unavoidable works are required within the buffer zone (including any fencing and vegetation removal and for installation of drainage outfalls), they would be subject to an additional risk assessment and appropriate controls to protect the SSSI as per the provisions of the Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). The buffer zones would be implemented in accordance with the Landscape and Habitat Management Strategy (Application Reference Number 8.16).

9.5.30 The SSSI is also buffered to the west by Dame Sylvia Crowe's Mound, which would be retained throughout construction, although a widened construction haul road for the Site Campus would be located between these two sites.

9.5.31 Appropriate signage would be erected on the fences demarcating the buffer zone to inform site personnel of the sensitivity of the SSSI and that the area is a construction no-go zone. These measures would be reinforced through 'toolbox talks' for all site personnel and through monitoring by an ECoW. These good practice mitigation measures would be delivered through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.5.32 Based on the above, the magnitude of change would be negligible. The effects of habitat loss and fragmentation (excluding air quality and hydrological changes) would be negligible.

Air quality changes

9.5.33 Air quality changes could arise through fugitive dust and emissions from construction plant, machinery and vehicles. The habitats at the Tre'r Gof SSSI are vulnerable to such changes.

9.5.34 Chapter D5 (Application Reference Number: 6.4.5) describes the air quality assessment that has been undertaken to identify any significant effects to the Tre'r Gof SSSI.

9.5.35 Chapter D5 (Application Reference Number: 6.4.5) details that nitrogen and acid deposition rates are predicted to increase by 22% by 2020, dropping to 11% and 12% respectively in 2023. This would result in acid levels exceeding

critical load values whereas baseline nitrogen deposition levels are already in excess of critical loads for alkaline fen habitats (see appendix B5-2 Main Site Construction Phase Air Dispersion EIA - Final Modelling Report (Air Quality), Application Reference Number: 6.4.21) for critical load values). A study by Caporn *et al.* (2016) [RD50] produced linear models to predict changes in habitat quality indicators based on incremental changes in long-term nitrogen deposition above critical loads, and this has been used to predict the change in habitat quality at the Tre'r Gof SSSI. Although alkaline fen as a defined habitat was not represented within the study, the nearest available equivalent was used; in this case bog habitat. It is acknowledged that, ecologically, the two habitats are distinct, but the effects of increased nitrogen deposition are considered similar for both. The study period employed in the work by Caporn *et al* (2016) [RD50] (a period of eight years), is different from the two peak periods of 2020 and 2023 assessed here. However, it is felt that the use of the Caporn *et al*. (2016) study represents a precautionary approach.

9.5.36 A typical response to increases in nitrogen deposition is an increase in nutrient-demanding plants such as grasses and sedges (graminoids), and the consequent loss of less competitive species such as smaller herbs and bryophytes [RD50]; [RD51] which are likely to represent the rarer, more important species present within the SSSI. The predictions for the Tre'r Gof SSSI, derived from the Caporn *et al*. 2016 [RD50] study, show a potential 2.6% decrease in overall species richness, a 7.6% decrease in forb species richness and a 4.4% increase in graminoid cover at 2020 deposition rates. Figures for 2023 deposition rates show a potential 1.3% decrease in overall species richness, a 3.8% decrease in forb species and a 2.2% increase in graminoid cover, although it is recognised that it is unlikely that species diversity would recover in the period between 2020 and 2023.

9.5.37 The increase in acid deposition at the Tre'r Gof SSSI is likely to be buffered by the alkaline nature of the fen, which makes it more resilient to changes in pH levels, although there are areas within the SSSI characteristic of acidic conditions that may be affected by acid deposition in the form of a decrease in species diversity.

9.5.38 Critical levels for atmospheric concentrations of NO_x would be exceeded at the Tre'r Gof SSSI by 49% for the annual mean concentration and 113% for the 24-hour mean concentration. Plant responses to increased concentrations are typically growth stimulus of aerial shoots and, at high concentrations, physiological damage. Gross effects on habitats are similar to nitrogen deposition as a whole with the loss of plant diversity and damage to bryophyte communities.

9.5.39 There is little published literature on the effects of increased atmospheric NO_x concentrations on semi-natural habitats and what does exist looks at brief periods of exposure (three weeks in the case of Morgan, Lee and Ashenden, 1992 [RD52]). It is therefore considered that the medium-term exposure to the predicted concentrations during construction would reflect and potentially exacerbate the changes in species diversity within the SSSI resulting from nitrogen and acid deposition.

9.5.40 Chapter D5 (Application Reference Number: 6.4.5) also describes the predicted effects of dust deposition. The Tre'r Gof SSSI is downwind of the prevailing wind direction to the nearby Mound A and the more distant areas where earthworks and construction activities would be undertaken, such as the Power Station Site and the laydown and landscape mounding area near Tregele.

9.5.41 However, Mound A does not encroach within approximately 100m of the south or east of the Tre'r Gof SSSI, meaning that the majority of dust emitted from the mound creation and landscaping activities would be deposited before reaching the SSSI [RD47]. The Site Campus at Wylfa Head would be approximately 50m north of the Tre'r Gof SSSI at its closest point, and therefore the prevailing wind direction from the south-southwest and southwest would generally transport any emitted dust from the Site Campus to the north-northeast and northeast away from the Tre'r Gof SSSI (chapter D5, Application Reference Number: 6.4.5).

9.5.42 Good practice mitigation measures comprise buffer zones; locating material stockpiles as far away from the Tre'r Gof SSSI as is practicable; grass seeding storage stockpiles as soon as practicable; and the regular use of dust suppression equipment, including water sprays, on the stockpiles. These mitigation measures are included within the Air Quality Management Strategy set out in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

9.5.43 Taken together, the changes in air quality emissions are predicted to lead to measurable changes in the attributes and quality of the Tre'r Gof SSSI, which would represent a small magnitude of change and a moderate adverse effect in the medium term, which is anticipated to reduce as changes reduce towards baseline conditions. Additional mitigation measures to reduce this effect are proposed in section 9.6, below.

Hydrological changes

9.5.44 There are several potential hydrological changes to the Tre'r Gof SSSI due to Main Construction and construction, operation and decommissioning of the Site Campus, as detailed in chapter D8 (Application Reference Number: 6.4.8). Based on the conclusions of chapter D8 (Application Reference Number: 6.4.8), the activities or changes that would potentially result in a minor magnitude of change or greater are discussed in this section.

9.5.45 Hydrological changes could arise via works within the Tre'r Gof Catchment. This includes topsoil stripping, construction of landscape mounds, dewatering of deep excavations, and construction, operation and decommissioning of the Site Campus. These activities could change surface water and groundwater conditions that may affect water quality and quantity within the SSSI.

9.5.46 The Tre'r Gof SSSI Site Management Statement [RD53] identifies the wetland as highly sensitive to changes in water level, stating that "*any actions that would reduce the amount of water entering Tre'r Gof would be damaging to the site*".

9.5.47 The Site Management Statement also states that:

"Good water quality is essential for maintenance of the characteristic assemblage of wetland plants and animals at Tre'r Gof. Nutrients such as nitrogen and phosphorous encourage the spread of strong growing plants…which can out-compete the less common (and more desirable) species at Tre'r Gof. This in turn would have a negative effect upon the animals that depend on these plants." [RD53]

9.5.48 The Site Management Statement also provides a list of potentially damaging operations that could result in hydrological change, many of which would arise during Main Construction and construction, operation and decommissioning of the Site Campus.

9.5.49 In order to understand how the notable features of the SSSI are maintained by the hydrological regime of the Tre'r Gof Catchment, a hydrological/hydrogeological CSM has been produced based on water quality, flow and level data collected since February 2015 (see chapter D8, Application Reference Number: 6.4.8). The CSM shows that the Tre'r Gof SSSI can be considered a seasonal, groundwater-dependent terrestrial ecosystem, dependent on winter recharge by shallow groundwater flows. The inflow of shallow groundwater in the soils brings mineral enriched water into the SSSI, with calcium concentrations being particularly important, supporting conditions for the plant communities within the SSSI (see table 4.1 in appendix D8-7 Surface water and groundwater modelling results, Application Reference Number 6.4.32). Full information on the relationship between hydrology and the ecology of the SSSI is provided in appendix D8-5 Tre'r Gof Hydroecological Assessment (Application Reference Number: 6.4.30).

9.5.50 The embedded and good practice mitigation measures that would be implemented to protect the SSSI are described in chapter D8 (Application Reference Number: 6.4.8) and section 9.4 of this chapter, but comprise:

- construction buffer zones;
- sediment settlement lagoons, ditches/swales, oil interceptors, attenuation tanks and other water treatment facilities to protect surface waters from contaminated or sediment-laden discharges;
- stone-filled, permeable, metal baskets set below ground for natural dispersion into the Tre'r Gof SSSI to trap silt and promote vegetation growth;
- a permeable drainage blanket made up of inert rock material beneath Mound A to the south and east of the Tre'r Gof SSSI to maintain the quality and quantity of surface water flows via the mound;
- use of overflow pipes and control weirs to maintain surface water overland flow; and
- adherence to the Environment Alliance's PPGs.

9.5.51 Although extensive mitigation is proposed, the landscape mounding and drainage would alter the area of the Tre'r Gof Catchment, resulting in changes to surface water flows within the catchment. These changes could particularly affect the south and west compartments of the Tre'r Gof SSSI, which are

reliant on multiple sources of inflows (see appendix D8-5, Application Reference Number: 6.4.30).

9.5.52 A reduction in water availability from diffuse seeps within the Tre'r Gof SSSI could arise due to the implementation of a managed drainage system, construction of the landscape mounds and Site Campus, and the associated drainage for these; this could have subsequent effects on the water quality of the SSSI. The inflow of shallow groundwater in the soils, superficial deposits and potentially the top of the bedrock into the SSSI and underlying peat deposits brings mineral enriched water into the SSSI via a series of small springs, seeps and flushes. A reduction in diffuse inflows could therefore reduce calcium concentrations within the SSSI, particularly in the east compartment (see appendix D8-7 for modelling information (Application Reference Number 6.4.32).

9.5.53 Rainfall onto the exposed bare earth surfaces (e.g. from site clearance, demolition of structures, haul roads, car parks, construction, operation and decommissioning of the Site Campus, soil storage and landscape mound creation) could all result in a high sediment loading in runoff. This could affect water quality within the Tre'r Gof drains. There is a particular risk of high suspended sediment concentrations in runoff from Mound A and Mound B before vegetation is fully established (see chapter D8, Application Reference Number 6.4.8).

9.5.54 Furthermore, topsoil stripping and movement and replacement of topsoil could result in the mobilisation of nutrients that are currently not exposed to leaching. Leaching tests have indicated that elevated concentrations of nutrients could be released from topsoil and these could therefore change water quality. However, any effect would be limited to the time periods when topsoil was being disturbed and the majority of increase in nutrients may pass through the Tre'r Gof SSSI in the drainage ditches rather than entering the peat fen. Additionally, any leaching which did occur would reduce rapidly with time.

9.5.55 Based on the above, chapter D8 (Application Reference Number: 6.4.8) concludes that the overall magnitude of change (based on the Hydrology Magnitude criteria in table B8-12 (Application Reference Number: 6.4.8)) on the whole SSSI due to a reduction in water availability is assessed as small. The magnitude of change on water quality is predicted to be small. These assessments take into account the good practice mitigation described in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), and the Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), including the use of settlement ponds and treatment (also see appendix D8-8 for further details (Application Reference Number: 6.4.33)).

9.5.56 Given the complexity of the hydrological regime, there is uncertainty relating to how effective the proposed mitigation would be. To address the uncertainty of the mitigation and how any hydrological changes may affect the SSSI, active management of the drainage system would be undertaken. This would include monitoring at every discharge point to determine if there is a significant departure from baseline conditions. If a change is detected, additional mitigation may be required (as outlined in chapter D8. Application Reference

Number: 6.4.8) and section 9.6, below). However, it is recognised that there is a high level of uncertainty over the efficacy of the proposed mitigation, and as such the assessment conclusion is based on a worst case scenario.

9.5.57 Given that the botanical communities within the SSSI are highly sensitive to water quality and quantity (see table 4.1 in appendix D8-7, Application Reference Number: 6.4.32), any changes in these are predicted to result in deterioration in the site's quality and species composition, and such changes to notable vegetation communities could compromise the SSSI's conservation status. As such, it is considered the changes in the site's hydrology could lead to severe damage to key characteristics of the site, potentially leading to the loss of such characteristics and the site's de-notification. Effects are likely to occur in the medium to long-term as the vegetation communities change slowly over time. Such a large magnitude of change would lead to a major adverse effect to the Tre'r Gof SSSI.

Introduction of INNS

9.5.58 There is the potential for the introduction of INNS into the Tre'r Gof SSSI through plant propagules entering the site. This could result in habitat loss/modification should fast-growing INNS start to colonise any of the terrestrial or aquatic habitats for which the site is designated.

9.5.59 The implementation of good practice measures included in the Biosecurity Method Statement (contained within the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)) would mitigate this risk. Good practice mitigation in the form of buffer zones would also contribute to the protection afforded to the SSSI by maximising the distance between the SSSI and potential sources of contamination.

9.5.60 The magnitude of change would be negligible. The effect due to INNS would therefore be negligible.

Combined effects

9.5.61 With the application of embedded and good practice mitigation it is predicted that major adverse effects could occur as a result of changes to hydrological conditions, and minor adverse effects through changes in air quality. There is the potential that these two effects could combine to affect the Tre'r Gof SSSI, but it is not considered that they would result in an effect greater than that already predicted, and that the overall effect would be major adverse.

Cae Gwyn SSSI

9.5.62 The potential for significant effects on the Cae Gwyn SSSI have been identified via the following pathways:

- habitat loss, fragmentation or modification;
- air quality changes;
- hydrological changes; and
- introduction and spread of INNS.

Habitat loss, fragmentation and modification

9.5.63 The SSSI is located adjacent to the Wylfa Newydd Development Area. There would be no direct habitat loss within the SSSI as a result of the Wylfa Newydd Project, although activities associated with construction of Mound C would be approximately 15m to the east of the SSSI boundary. In the absence of mitigation, construction works may result in degradation of the habitats on the boundary of the SSSI, e.g. due to littering, fugitive dust and changes to runoff regimes (the latter two are discussed separately, below).

9.5.64 Fragmentation effects as a result of Main Construction are not considered likely. This is due to the designated habitats within the SSSI already being isolated (by topography and associated hydrological conditions) from other areas with the potential to support a similar botanical assemblage. Therefore, there would be no risk of severing links with similar habitats nearby.

9.5.65 Good practice mitigation would include a 15m-wide buffer zone along the section of the SSSI boundary adjacent to the Wylfa Newydd Development Area within which construction activities would not encroach. Good practice mitigation implemented via the General Site Management Strategy (contained in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)) would also ensure that littering is avoided and that a tidy construction site is maintained, thus mitigating the risk of habitat degradation.

9.5.66 Based on the above, a negligible magnitude of change is predicted as a result of habitat loss, fragmentation and modification, resulting in negligible effects.

Air quality changes

9.5.67 The sphagnum moss present within the Cae Gwyn SSSI is highly sensitive to air quality changes. The habitats and species within the site would also be potentially sensitive to dust deposition.

9.5.68 Chapter D5 (Application Reference Number: 6.4.5) scopes out any effects from changes to both annual mean and 24-hour mean NO_x concentrations on the Cae Gwyn SSSI, Nitrogen and acid deposition at the site is currently below critical load values. The predicted increase in nitrogen deposition would lead to a 5% increase in 2020, taking it over the critical load level. Acid deposition is predicted to increase by 6% in 2020, although this would not lead to an exceedance of critical load.

9.5.69 In 2023, concentrations for nitrogen and acid are lower than in 2020 but still predict a 3% and 2% increase respectively, nitrogen deposition still being above the critical load value.

9.5.70 Predictions for the change in species composition as a result of air quality effects at the Cae Gwyn SSSI, derived from the Caporn *et al.* 2016 [RD50] study, show a potential 0.5% decrease in total species richness, a 2.1% decrease in forb species richness and a 0.8% increase in graminoid cover at 2020 deposition rates. At 2023 deposition rates, these predictions show a potential 0.2% decrease in overall species richness, a 1.0% decrease in forb species and a 0.4% increase in graminoid cover. The changes recorded in the study occurred over a period of eight years so the predicted changes to

species composition above represent a precautionary approach given that deposition rates are assessed at the two peak periods of 2020 and 2023.

9.5.71 With respect to dust deposition, the Cae Gwyn SSSI is located within 50m of sources of fugitive dust, notably Mound C. The area of the SSSI that falls within the 50m study area for dust is limited to approximately 1.4ha (approximately 13% of the 10.1ha area designated as SSSI), along the eastern boundary of the Cae Gwyn SSSI. However, the air quality assessment in chapter D5 (Application Reference Number: 6.4.5) considers that the prevailing wind direction from the south-southwest and southwest would generally transport any emitted dust from the landscape mounding area away from the Cae Gwyn SSSI. Chapter D5 (Application Reference Number: 6.4.5) considers that winds blowing from the north-northeast to the west, (representing the direction from where works would be closest to the SSSI) would occur for only approximately 14% of the year during dry conditions.

9.5.72 Activities with the potential to generate dust within 50m of the Cae Gwyn SSSI would be temporary and limited to the initial soil stripping and subsequent mound creation. During this period, the proposed embedded and good practice mitigation, including dust suppression and control measures, monitoring and surveys/inspections, would be focused on preventing dust emissions causing a significant effect at the Cae Gwyn SSSI.

9.5.73 Taken together, the changes in air quality are predicted to lead to very small measurable changes in the interest features and quality of the Cae Gwyn SSSI, which would represent a small magnitude of change and a minor adverse effect in the medium term, which is anticipated to reduce as changes reduced towards baseline conditions. Additional mitigation measures to reduce this effect are proposed in section 9.6, below.

Hydrological changes

9.5.74 No works would take place within the boundary of the Cae Gwyn SSSI although activities occurring within the surface water catchment of the SSSI comprise site clearance works and the creation of Mound C. The proposed landscape mound would be located approximately 15m to the east of the SSSI boundary.

9.5.75 An assessment of the possible hydrological effects to the Cae Gwyn SSSI is provided in chapter D8 (Application Reference Number: 6.4.8). Based on the conclusions of chapter D8 (Application Reference Number: 6.4.8), the activities or changes that would potentially result in a minor magnitude of change or greater are discussed in this section.

9.5.76 The SSSI is at the upstream end of Nant Caerdegog Isaf and direct rainfall and surface water runoff from the immediately surrounding area provide the main inflow into the Cae Gwyn SSSI. A study of the hydrological regime of the Cae Gwyn SSSI has been undertaken to create a conceptual model that can be used to inform an assessment of how any hydrological changes might alter the ecology of the site (see appendix D8-6 Cae Gwyn Hydroecological Assessment, Application Reference Number 6.4.31). The assessment showed the site as consisting of four distinct hydrological areas: the Northern

Basin, the Western Basin, the Southern Basin and the Primary Outfall Basin (POB).

9.5.77 It considered that neither the Northern nor Western Basins are supported by groundwater as winter groundwater levels in the bedrock remain below the basin floor at both locations. The Southern Basin is also not considered to be supported by groundwater, although there is the possibility that bedrock groundwater levels recorded in the SSSI intersect the base of the peat in the Southern Basin during winter. The POB is predominantly surface-water fed with inflows more or less equal to outflows (over the monitoring period), albeit with significant seasonal variations; during winter, bedrock groundwater levels are within the peat, potentially providing an inflow of groundwater into the basin although this is not thought to be significant in terms of volume. However, its chemical contribution may influence the rich-fen vegetation found there.

9.5.78 Although there could be some changes to the catchment area due to the construction of Mound C, the changes would be outside of the SSSI boundary and only affect a small part of the POB.

9.5.79 Dewatering of deep excavations has the potential effect of drawing down groundwater levels at the Cae Gwyn SSSI and either reducing any groundwater input to the SSSI, or increasing leakage to groundwater from the SSSI. In addition, the construction of Mound C may result in a reduction of direct groundwater recharge and hence a change in groundwater levels near the SSSI.

9.5.80 Based on the above, Chapter D8 (Application Reference Number: 6.4.8) concludes that the potential magnitude of change to water flows to the SSSI is likely to be small, and that this would affect the POB only. The magnitude of change for recharge to deep groundwater would also be small.

9.5.81 The POB principally comprises a quaking bog which supports a range of grass and rush species typical of moderately base-rich conditions; willow carr is also present. This catchment is water logged during winter and can dry out in summer, indicating its reliance on precipitation and surface water flows (see appendix D8-6) (Application Reference Number: 6.4.31).

9.5.82 The Site Management Statement for the SSSI states that a high-water table is essential for the survival of wetland plants and animals, and that no work should be carried out which would lower water levels on the site [RD53].

9.5.83 Although the POB naturally dries in summer and the species present are relatively tolerant of periodic drying, the existing water supply is currently sufficient to re-wet the peat substrate during the winter. This annual re-wetting controls the growth of grass species, such as purple moor-grass (*Molinia caerulea*), that might otherwise outcompete the more sensitive species for which the SSSI is designated.

9.5.84 The POB receives water from other basins that make up the SSSI, principally over-topping from the southern basin, and does not itself input into the wider site. Any changes to the POB would be localised and would not adversely affect the three other basins that make up the rest of the SSSI.

9.5.85 The small magnitude of change predicted in chapter D8 (Application Reference Number: 6.4.8) is considered to have the potential to lead to a minor alteration in the species composition of the SSSI as more competitive species dominate the rarer species that contribute to the importance of the SSSI. It is considered that this would result in a minor adverse effect on the Cae Gwyn SSSI. Additional mitigation is discussed in section 9.6.

Introduction and spread of INNS

9.5.86 There is the potential for the introduction and spread of INNS into the Cae Gwyn SSSI through run-off contaminated with plant propagules. This could result in habitat loss/modification should fast-growing INNS start to colonise any of the terrestrial or aquatic habitats for which the site is designated.

9.5.87 The implementation of good practice measures such as buffer zones and a Biosecurity Method Statement (contained within the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)), means the magnitude of change would be negligible. The effects due to INNS would therefore be negligible.

Combined effects

9.5.88 With the application of embedded and good practice mitigation it is predicted that minor adverse effects would occur as a result of changes to hydrological conditions, and minor adverse effects through changes in air quality. There is the potential that these two effects could combine to affect the Cae Gwyn SSSI, but it is not considered that they would result in a greater magnitude of change than that already predicted, and therefore the overall effect would be minor adverse.

Cemlyn Bay SSSI and Bae Cemlyn/Cemlyn Bay SAC

9.5.89 For the purpose of the assessment of terrestrial and freshwater ecology receptors, vegetated shingle is the only designated feature of interest considered. The other designating features are included within chapter D13 (marine environment) (Application Reference Number: 6.4.13).

9.5.90 Pathways for potential significant effects on the Cemlyn Bay SSSI are therefore considered to be restricted to:

- air quality changes; and
- changes to coastal processes.

Air quality changes

9.5.91 The Cemlyn Bay SSSI/SAC is approximately 110m from the Wylfa Newydd Development Area at its closest point, and so the vegetated shingle habitats are vulnerable to air quality change arising through emissions from plant and machinery.

9.5.92 Chapter D5 (Application Reference Number: 6.4.5) scopes out any effects from changes to annual mean and 24-hour NO_x concentrations and from changes in nitrogen deposition on the Cemlyn Bay SSSI/SAC. Current acid deposition rates are below the critical load value and are not predicted to

exceed them, but rates would increase by 12% by 2020, and in 2023, acid deposition rates would be 4% above baseline.

9.5.93 The SSSI/SAC is outside the 50m area likely to be affected by dust deposition, with Mound E being located approximately 110m away [RD47]. Furthermore, a meteorological data analysis indicates that the wind that could transport any emitted dust from the landscape mound area towards the SSSI/SAC during dry conditions (i.e. wind blowing from the east-southeast through to the south) would occur for only approximately 8% of the time (chapter D5, Application Reference Number: 6.4.5). As such, the effects of dust are considered to be negligible.

9.5.94 Taken together, the changes in air quality emissions are predicted to lead to a negligible change in the interest features and quality of the Cemlyn Bay SSSI/SAC which would represent a negligible effect.

Changes to coastal processes

9.5.95 The construction of permanent and temporary infrastructure within the marine environment has the potential to affect coastal processes and geomorphology and is discussed in chapter D12 (Application Reference Number: 6.4.12).

9.5.96 Changes to coastal processes could adversely affect the shingle ridge habitats for which the SSSI is designated through increased sediment deposition or by increasing erosion from wave action, thus reducing the area of available habitat for perennial vegetation to grow and/or directly affecting perennial vegetation growth. Such habitat modifications could also increase the susceptibility of the notable habitats to non-Project effects, such as trampling.

9.5.97 Chapter D12 (Application Reference Number: 6.4.12) predicts that changes associated with coastal processes and sediment deposition would result in a negligible magnitude of change.

9.5.98 As such, it is considered that there would be a negligible effect on the shingle ridge and its associated vegetation at Cemlyn Bay SSSI/SAC. This conclusion is consistent with the findings of the Shadow HRA.

Llyn Llygeirian SSSI

9.5.99 Pathways for potential significant effects on the Llyn Llygeirian SSSI are considered to be restricted to air quality changes.

9.5.100 However, chapter D5 (Application Reference Number: 6.4.5) scopes out significant effects on the wildlife site resulting from dust deposition, increased rates of nitrogen and acid deposition and elevated levels of NOx. The effects of changes in air quality on Llyn Llygeirian SSSI are therefore not considered further in this assessment.

Trwyn Pencarreg Wildlife Site

9.5.101 Pathways for potential significant effects on the Trwyn Pencarreg Wildlife Site are considered to be restricted to air quality changes. However, chapter D5 (Application Reference Number: 6.4.5) scopes out significant effects on the wildlife site resulting from dust deposition, increased rates of nitrogen and acid deposition and elevated levels of NOx. The effects of changes in air quality

on Trwyn Pencarreg Wildlife Site are therefore not considered further in this assessment.

Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site

9.5.102 The Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site is designated for coastal grassland, a colony of gulls, chough and harbour porpoise (see section 9.3). Effects on chough are assessed separately in this chapter, and effects on the colony of gulls and harbour porpoise are assessed in chapter D13 (Application Reference Number: 6.4.13).

9.5.103 The potential pathways to significant effects are therefore considered to be habitat loss, fragmentation and modification; and air quality changes, both of which could affect coastal grassland.

Habitat loss, modification and fragmentation

9.5.104 There would be 1.1ha of habitat lost from within the boundary of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site (5% of the total site area), as a result of the construction of the outfall infrastructure. The habitats lost comprise coastal grassland with some scrub, and would be temporary: the outfall structure runs underground, so would be recovered and dressed with topsoil once complete; the Site Campus would be in operation during the construction period, then removed with habitat established in line with the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). This would represent a small magnitude of change, as it is considered that this would be a minor loss of a key characteristic, feature or element of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.

9.5.105 Degradation (modification) of habitats is also possible due to increased footfall on the headland caused by workers residing in the Site Campus using the area for recreation. This could lead to trampling of grassland habitats and widening of existing pathways to form areas of bare earth. This would represent a medium magnitude of change, as it is considered possible that there would be some damage and loss of resource, but that this would not affect the integrity of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.

9.5.106 Taken together, it is assessed that the combined effects of habitat loss and degradation would result in a moderate adverse effect and additional mitigation is proposed, as described in section 9.6.

Air quality changes

9.5.107 As the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site is directly affected by construction work within its boundary, sources of fugitive dust would be present within the site itself and within 50m of much of its boundary. Activities with the potential to generate dust would be temporary, associated with construction of the Site Campus, cooling water outfall and Mound A. During this work, the proposed embedded and good practice mitigation, including dust suppression and control measures, monitoring and surveys/inspections, would be focused on preventing dust emissions causing

a significant effect at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.

9.5.108 Chapter D5 (Application Reference Number: 6.4.5) details the air quality assessment undertaken for the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site. The modelling results which support the air quality assessment are provided in appendix B5-2 (Application Reference Number: 6.4.21) and are based on information from reference points on the southern boundary of the Wylfa Head headland, and along the coastal grassland between Porth y Ogof, Porth y Wylfa and Trwyn y Penrhyn.

9.5.109 Chapter D5 (Application Reference Number: 6.4.5) scopes out any effects from changes to annual mean and 24-hour mean NOx concentrations on the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, as well as changes in acid deposition. Changes in nitrogen deposition are scoped in for further assessment.

9.5.110 The two reference points which show the greatest levels of air quality change are located within the areas affected by the outfall and by the Site Campus, where the habitats potentially affected by these air quality changes would be lost as a result of construction. Given these modelled data would not be representative of the overall air quality changes across the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, the highest modelled changes in nitrogen deposition within retained habitats has been used as the level against which potential effects have been assessed. This predicts nitrogen deposition of 4.3kgN/ha/year in 2020, an increase of 33% on the current baseline. Deposition levels in 2023 have been scoped out in chapter D5 (Application Reference Number: 6.4.5) as not requiring further assessment.

9.5.111 Predictions for the change in species composition as a result of air quality effects at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, derived from results of the Caporn et al. 2016 [RD50] study for acid grassland, show a potential 5.1% decrease in total species richness. The model did not allow for a calculation of likely change in total for species richness, nor increase in graminoid cover, although it is considered that the decrease in overall species diversity would lead to a greater reduction in the more sensitive, rarer species present, as the more resilient graminoid species outcompeted them.

9.5.112 Taken together, the changes in air quality are predicted to lead to measurable changes in the attributes and quality of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, which would represent a small magnitude of change and a moderate adverse effect during the period of peak bulk earthworks (modelled as occurring in 2020). This is anticipated to reduce as changes reduce towards baseline conditions, with effects of air quality change scoped out for the period of peak Power Station construction (modelled as occurring in 2023). Additional mitigation measures to reduce this effect are proposed in section 9.6, below.

Combined effects

9.5.113 With the application of embedded and good practice mitigation it is predicted that moderate adverse effects would occur as a result of habitat loss and degradation, and moderate adverse effects through changes in air quality.

There is the potential that these adverse effects could combine to affect the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, but it is not considered that they would result in a greater magnitude of change than that already predicted, and therefore the overall effect would be moderate adverse. The assessment of chough, an interest feature of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, is undertaken separately (see below), but its conclusion of moderate adverse effects has been taken into account in this combined effects assessment

Ancient woodland

9.5.114 The ancient woodland habitat at Simdda-Wen (ID 26059) and The Firs Hotel (ID 26075) would be lost via tree felling and vegetation and topsoil clearance to facilitate construction of the Power Station. Construction activities would also be located within close proximity to the retained woodland at Manor Garden (ID 26060). Potential pathways to significant effects are considered to be:

- habitat loss, fragmentation and modification; and
- air quality changes.

Habitat loss, modification and fragmentation

9.5.115 The removal of woodland habitat at Simdda-Wen and The Firs Hotel would result in the loss of 0.8ha of ancient woodland. These two blocks of ancient woodland are located within the footprint of the Power Station Site and their removal is considered to be a large magnitude of change.

9.5.116 Retained ancient woodland at Manor Garden could potentially be degraded due to construction activity within the immediate vicinity e.g. due to littering or damage to trees or roots due to tracking of machinery or excavation.

9.5.117 Good practice mitigation implemented via the General Site Management Strategy of the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) would seek to ensure that littering is avoided and that a tidy construction site is maintained. The Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would also seek to protect retained trees through the implementation of appropriate buffer and root protection zones, as per the provisions of BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations* [RD54].

9.5.118 The three small areas of ancient woodland within the Wylfa Newydd Development Area are not linked by connecting habitats and do not form part of a larger complex of woodland habitat. As such, the retained woodland at Manor Garden would not be isolated from any associated or supporting habitats due to construction activities.

9.5.119 Given the high value of this receptor, and the large magnitude of change predicted due to the losses at Simdda-Wen and The Firs Hotel, a major adverse effect is anticipated. Additional mitigation is proposed, as described in section 9.6.

Air quality changes

9.5.120 For the retained ancient woodland at Manor Garden (ID 26060), Chapter D5 (Application Reference Number: 6.4.5) identifies annual mean NO_x concentrations as requiring further ecological assessment, together with nitrogen deposition rates. Acid and dust deposition on ancient woodland, and 24-hour mean NO_x concentrations are below the thresholds which require further assessment.

9.5.121 In 2020, critical levels for atmospheric concentrations of NO_x are predicted to be exceeded by 38% for annual mean levels. In 2023, these levels are predicted to have dropped sufficiently to allow them to be omitted from further assessment. Existing nitrogen deposition rates are already in exceedance of critical load, but are predicted to increase by 32% in 2020.

9.5.122 The predicted medium-term changes in air quality are unlikely to result in any measurable changes in the tree species within the woodland [RD55]. Effects on the diversity and condition of the ground flora and epiphytic lichen assemblage may be more pronounced, although the botanical interest within the woodland is limited (see appendix D9-18 Application Reference Number: 6.4.51).

9.5.123 As such it is predicted that the changes in air quality would lead to a very minor loss of, or detrimental alteration to the ancient woodland characteristics, representing a negligible magnitude of change and a negligible adverse effect.

Terrestrial habitats

9.5.124 Potential pathways to significant effects are considered to be habitat loss, fragmentation and modification.

9.5.125 The effects of air quality change, water quality change and the introduction of INNS are not considered likely to result in significant adverse effects to retained habitats due to the low value of the receptor and the implementation of embedded and good practice mitigation (see section 9.4). These effects are therefore not considered further.

Habitat loss, fragmentation and modification

9.5.126 Habitat loss, fragmentation and modification would arise through the clearance of vegetation and topsoil from the majority of the Wylfa Newydd Development Area.

9.5.127 Table D9-7 shows the area of each non-linear Phase 1 habitat type within the Wylfa Newydd Development Area where losses or modification would occur. Areas such as buildings and hardstanding, as well as habitats protected by buffer zones (see section 9.4), have been omitted from this table.

Table D9-7 Habitat changes within the Wylfa Newydd Development Area

Phase 1 habitat type	Potential area affected (ha) (approx.)
Improved grassland	142.3
Poor semi-improved grassland	64.5
Semi-improved neutral grassland	22.4
Arable (no longer cultivated)	20.2
Amenity grassland	7.3
Marsh/marshy grassland	3.6
Bare ground	1.4
Coastal/Maritime Grassland	0.8
Natural rock exposure	0.6
Tall ruderal herbs	0.3
Ephemeral/short perennial land	0.2
Inland mine	0.2
Running water	0.2
Standing water	0.1
Scrub – scattered	3.6
Scrub – dense/continuous	3.5
Coniferous plantation woodland	2.0
Broadleaved plantation	1.8
Mixed plantation woodland	1.0
Broadleaved parkland	0.2
TOTAL	276.2ha

9.5.128 A permanent loss of habitats would occur as a result of permanent infrastructure i.e. the Power Station, Training and Simulator Building, car parks and associated access roads. The remaining areas would be reinstated through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.5.129 The following habitats that are listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016 would be lost due to construction of the Power Station: scrub, plantation woodland, ponds, coastal grassland and marshy grassland. Combined, this accounts for an area of approximately 15ha, or 5% of the total. There would also be the loss of approximately 29km of field boundaries.

9.5.130 The geographical location of the Wylfa Newydd Development Area means that, once cleared, there would be separation of similar areas of habitat and so fragmentation effects would arise. This would affect Wylfa Head and a coastal grassland strip which would be separated from habitats to the south. These effects would last for the duration of Main Construction, Marine Works and the Site Campus.

9.5.131 The loss and fragmentation of habitats would be compensated for via habitat re-creation as detailed in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). The establishment of habitats would be programmed to come into effect as soon as practically possible, starting during the construction period, thereby reducing periods of habitat loss. The habitats created would be of equal or greater value to nature conservation than those lost.

9.5.132 Habitats proposed for creation comprise (approximate values):

- 40ha of improved agricultural grassland (to be sympathetically managed);
- 20ha of close-sward species-rich grassland;
- 100ha of coarse-sward species-rich grassland;
- 10ha of marshy wet grassland;
- 20ha of woodland;
- 10ha of coastal heath/grass mosaic; and
- 10km of hedgerow and cloddiau.

9.5.133 On completion of construction, it is also proposed to convert suitable sedimentation ponds, channels and swales installed during construction to permanent or seasonally wet waterbodies or areas of damp ground.

9.5.134 The newly created, restored and enhanced habitats account for an area of approximately 210ha. Although approximately 276ha of habitat would be removed to enable construction of the Power Station (a deficit of approximately 66ha), the habitats created through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would be of greater biodiversity value and would provide a net biodiversity gain in the long-term. For example, approximately 20ha of woodland would be created compared to the approximate 5ha lost (300% increase); approximately 10ha of marshy wet grassland would be created compared to the approximate 3.6ha lost (178% increase); and approximately 10ha of coastal heath/grass mosaic would be created compared to the approximate 0.8ha lost (1,150% increase). However, there would be a 65% reduction in field boundaries from approximately 29km to 10km, although not all of the field boundaries lost are hedgerows (some are stone walls or fences); the proposed new hedgerows would also be more species diverse than the typically species-poor hedgerows currently within the Wylfa Newydd Development Area.

9.5.135 The majority of the habitat that would be lost is agricultural grassland comprising an area of approximately 229ha, or 83% of the total. The grassland habitat itself is of relatively low value (predominantly improved and

poor semi-improved types). Approximately 180ha of grassland would be reinstated, approximately 120ha being species-rich.

9.5.136 Due to the size of the area affected, the magnitude of change would be medium in the medium-term. As the habitat permanently lost under the footprint of permanent infrastructure mainly comprises low quality grassland, and the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would mitigate habitat losses in the long-term through the creation of habitats of higher biodiversity value, the medium magnitude of change is not expected to affect the integrity of terrestrial habitats. As such, a minor adverse effect due to habitat loss, fragmentation or modification is predicted. Additional mitigation is described in section 9.6.

Fungi

9.5.137 Fungi are potentially susceptible to effects via the following pathways:

- habitat loss and degradation; and
- air quality changes.

Habitat loss, fragmentation and modification

9.5.138 As described in section 9.3 and shown in figure D9-11 (Application Reference Number: 6.4.101), there are three survey sites within the Wylfa Newydd Development Area that support assemblages of fungi of national importance and three survey sites that support assemblages of regional importance. A pathway for a potentially significant effect on fungi is considered to be habitat loss during Main Construction and modification by degradation caused by trampling due to worker pressure.

9.5.139 The extent of the construction works in relation to important areas of grassland fungi is shown in figure D9-11 (Application Reference Number: 6.4.101). The size and value of each grassland survey area is shown in table D9-8.

Table D9-8 Value and size of fungi sites

Area	Value	Total size (ha)
1	High	1.2
2	High	3.5
3	High	13.7
4	Medium	0.9
5	Medium	2.5
6	Medium	1.5
Total	-	23.3

9.5.140 Table D9-8 shows that the total area of medium and high value grassland due to the presence of fungi within the Wylfa Newydd Development Area is 23.3ha. Main Construction would not directly affect the high value survey sites, but all medium value survey sites (totalling 4.9ha) would be lost as a result of earthworks.

9.5.141 The loss of the three medium value sites (4, 5 and 6) is considered to be a medium magnitude of change. This is based on the effect resulting in the partial loss of the receptor that will not adversely affect its integrity. Data presented in appendix D9-1 (Application Reference Number: 6.4.34) show that, despite the loss of 4.9ha of habitat of medium value, there would only be a loss of one species of fungi from the members of the genera *Hygrocybe* (Waxcaps) and *Entoloma* (Pinkgills) and the families Clavariaceae (Fairy Clubs) and Geoglossaceae (Earth Tongues) within the Wylfa Newydd Development Area; one from the 32 species recorded in total in 2013 and 2017. This species is hairy earth tongue (*Trichoglossum hirsutum*), which is a lowest level indicator species ([RD56] and [RD57]), with a national status that is common and widespread.

9.5.142 In addition to the loss of habitats, there is the potential for habitat modification caused by increased footfall on the headland caused by workers residing in the Site Campus using the area for recreation. This could result in trampling of grassland habitats and widening of existing pathways. This is unlikely to affect fungi in terms of their subterranean structures (grassland fungi exist in the soil as mycelia) unless damage to surface habitats is very severe, but the short-lived fruiting bodies could be damaged and reproduction could therefore be affected.

9.5.143 Based on the assessment above, the effect of habitat loss and degradation (modification) on fungi is considered to represent a small magnitude of change as a result of the loss of a key feature of the receptor, which would be a moderate adverse effect. Additional mitigation is proposed as described in section 9.6.

Air quality changes

9.5.144 There is an absence of published literature on the effects of changes in air quality on grassland fungi, the majority of the literature relating to fungi in woodland habitats. However, as with the predicted effects of air quality changes on designated sites, as nitrogen and acid deposition and NOx concentrations increase, species diversity decreases and, on a precautionary basis, it is assumed this would occur for fungi within the retained grassland habitats in the Wylfa Newydd Development Area.

9.5.145 Given the high value fungi areas (sites 1, 2 and 3: Appendix D9-1, Application Reference Number: 6.4.34) lie within retained areas of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, the assessment of air quality effects on this designated site has been used to determine the potential effects of air quality changes on fungi. Chapter D5 (Application Reference Number: 6.4.5) scopes out any effects from changes to annual mean and 24-hour mean NOx concentrations on the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, as well as changes in acid deposition loads. Changes in nitrogen deposition during peak bulk earthworks are scoped in for further assessment, with chapter D5 (Application Reference Number: 6.4.5) predicting nitrogen deposition of 4.3kgN/ha/year, an increase of 33% on the current baseline.

9.5.146 Sources of fugitive dust would be present within 50m of sites 2 and 3 of the high value fungi sites (Appendix D9-1, Application Reference Number: 6.4.32). Site 1 is located approximately 300m away from any construction activity.

Activities with the potential to generate dust would be temporary, associated with construction of the Site Campus, cooling outfall and Mound A. During this work, the proposed embedded and good practice mitigation, including dust suppression and control measures, monitoring and surveys/inspections, would be focused on preventing dust emissions causing a significant effect on these high value sites.

9.5.147 The assessment for the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site predicted measurable changes in the attributes and quality of the wildlife site, which would represent a small magnitude of change and a moderate adverse effect during the period of peak bulk earthworks (modelled as occurring in 2020). This was anticipated to reduce as changes reduce towards baseline conditions, with effects of air quality change scoped out during the period of peak Power Station construction (modelled as occurring in 2023). Based on this assessment, and taking the effect of habitat loss and degradation into account, it is considered that a small magnitude of change would be felt by fungi as a receptor, and a moderate adverse effect is predicted.

Lichen

9.5.148 Lichen are potentially susceptible to effects via the following pathways:

- habitat loss; and
- air quality changes.

Habitat loss

9.5.149 The removal of vegetation, drystone walls and rock outcrops would potentially affect communities of lichen, although the most notable lichen communities within the field survey study area were outside the Wylfa Newydd Development Area. These included the marine and supralittoral communities of the rocky shore, sea-cliff and coastal heathland around Trwyn Pencarreg Wildlife Site, and a rock outcrop to the north of the Wylfa Newydd Development Area.

9.5.150 Important lichen communities are also located within close proximity to the Site Campus (survey locations 5 and 6 (see appendix D9-2, Application Reference Number: 6.4.35)), but these would be protected and retained through the embedded mitigation design and so would not be affected by habitat loss.

9.5.151 Limited habitat loss is predicted as the sycamore (*Acer pseudoplatanus)* trees which *Ramalina fraxinea* was recorded growing on would be felled as part of the Power Station construction works. Additional mitigation is described in section 9.6 with respect to this impact.

9.5.152 Based on the small magnitude changes to lichen communities that would arise due to habitat loss, a negligible effect is predicted.

Air quality

9.5.153 Lichen is vulnerable to air quality change arising through emissions of dust and emissions from construction plant, machinery and vehicles. Chapter D5 (Application Reference Number: 6.4.5) describes the air quality assessment

that has been undertaken, the results of which have been used to identify any significant effects to lichen.

9.5.154 The marine, supralittoral and rocky zones around Trwyn Pencarreg represent the most valuable area for lichens within the Wylfa Newydd Development Area. Chapter D5 (Application Reference Number: 6.4.5) predicts increases in annual mean and 24-hour NO_x concentrations in this area.

9.5.155 Little is known about the effects of air pollution on seashore lichens. Rocky shores near to industrial centres have been shown to possess simplified seashore lichen communities compared with shores away from sources of air pollution, but the effect of wind and wave action on rocky coastal habitats may act to mitigate the detrimental effects of air pollution on lichens [RD58].

9.5.156 The predicted changes would be restricted to the construction period only, and would be reversible on completion of works. However, given the high predicted concentration of NO_x in the Trwyn Pencarreg area it is considered that a small magnitude change may occur. A minor adverse effect on lichen communities is therefore predicted as a result of air quality changes.

Terrestrial invertebrates

9.5.157 The main effects on terrestrial invertebrates would occur during vegetation and topsoil clearance, although effects could also arise due to lighting during the construction period. Potential pathways to significant effects are therefore considered to be:

- mortality and injury;
- habitat loss; and
- disturbance.

Mortality and injury

9.5.158 Vegetation and topsoil clearance would result in injury and mortality to invertebrates. These effects would be less severe for flying insects which are highly mobile, if activities take place during their flying season. However, subterranean species, non-flying species and the larvae, pupae and eggs of many species recorded would be affected.

9.5.159 Many night flying species of insect are attracted to light, especially those lamps that emit an ultra-violet component and particularly if it is a single light source in a dark area [RD59]. Insects can die or become injured when they collide with a hot lamp or they can become disorientated and exhausted making them more susceptible to predation [RD59]. The effects of artificial lighting would be temporary in the medium-term (i.e. up until the end of the construction period).

9.5.160 Based on the above, a small magnitude of change is predicted resulting in a minor adverse effect, although additional mitigation is proposed (see section 9.6).

Habitat loss

9.5.161 Extensive areas of habitat would be removed during the vegetation clearance and topsoil stripping phase of construction, although some of the more valuable habitats for invertebrates (e.g. wetland areas around the Tre'r Gof SSSI and coastal heathland grassland) would be retained.

9.5.162 The removal of many habitats would be temporary in the short and medium-term (up until the end of the construction period) as embedded mitigation implemented via the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) includes the reinstatement, creation and enhancement of habitats of value for invertebrates. For example, new habitats would include approximately 20ha of close-sward species-rich grassland; approximately 100ha of coarse-sward species-rich grassland; approximately 10ha of marshy wet grassland; approximately 20ha of woodland; and approximately 10ha of coastal heath/grass mosaic. In addition, field boundaries would be recreated using traditional materials, new ponds would be created, and approximately 10km of species-rich hedgerow would be planted.

9.5.163 For notable species like the grayling and wall brown butterflies, permanent effects are therefore unlikely, and recovery would take an estimated two to three seasons. Much of the habitat suitable for cinnabar moth is located outside the area affected by site clearance works (e.g. Wylfa Head), although the species is also likely to return to the reinstated and replaced habitats as these would be managed more sympathetically than at present and with a greater focus on nature conservation. Small heath butterfly would be less affected by habitat loss as it can be found in many different habitats, especially those that are open, such as grassland and heathland; such habitats can be found in abundance immediately adjacent to the Wylfa Newydd Development Area.

9.5.164 Taking into account good practice mitigation (buffer zones) and the restoration, creation, and enhancement of habitats via the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), habitat loss is predicted to result in a small magnitude of change and so negligible effects are predicted.

Disturbance

9.5.165 Increased lighting requirements during the construction period could disturb the behaviour of nocturnal flying insects by disturbing their flight, navigation, vision, migration, dispersal, egg-laying, mating, feeding and camouflage [RD59].

9.5.166 The effects of artificial lighting would be temporary in the medium-term. A small magnitude of change and minor adverse effect is predicted due to disturbance, although additional mitigation is proposed (see section 9.6).

Combined effects

9.5.167 With the application of embedded and good practice mitigation it is predicted that minor adverse effects would occur as a result of mortality/injury, and minor adverse effects through disturbance. There is the potential that these two

effects could combine to affect terrestrial invertebrates, but it is not considered that they would result in a greater magnitude of change than that already predicted, and therefore the overall effect would be minor adverse.

Great crested newt

9.5.168 Potential pathways to significant effects are considered to be:

- mortality and injury; and
- habitat loss.

Mortality and injury

9.5.169 GCN have been identified as present in low numbers in the area surrounding and within the Cae Gwyn SSSI. Construction works within 500m of the Cae Gwyn SSSI GCN population and breeding ponds has the potential to kill or injure these animals. This could affect the favourable conservation status of GCN in the local area.

9.5.170 Good practice mitigation carried out under an EPSML would be required, as described in the GCN draft EPSML Method Statement (see appendix D9-21, Application Reference Number: 6.4.54) and summarised below:

- trapping and translocation of GCN from all suitable habitats in the Wylfa Newydd Development Area within 250m of the Cae Gwyn SSSI GCN population; and
- sensitive destructive searching under supervision of an ECoW, of suitable habitats in the Wylfa Newydd Development Area within 500m of the Cae Gwyn SSSI GCN population.

9.5.171 GCN translocated from the construction area would be released in suitable terrestrial habitat close to the Cae Gwyn SSSI, as detailed in the EPSML application.

9.5.172 The good practice mitigation would ensure that the proposed works are not detrimental to the maintenance of the GCN population at a favourable conservation status, as required by Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.

9.5.173 Given the above, a negligible magnitude of change would arise and negligible effects to GCN are predicted due to mortality or injury.

Habitat loss and fragmentation

9.5.174 Good practice guidance advises that suitable habitats within 250m of a breeding pond are likely to be used most frequently by GCN if there is an absence of dispersal barriers. Small-scale losses of terrestrial habitat, especially over 250m from the breeding pond, are also considered unlikely to have significant effects on GCN [RD1]. As such, it is considered that the effects of habitat loss and fragmentation would only be experienced within 250m of the GCN ponds, a conclusion that was supported by NRW (pers. comm.).

9.5.175 Based on a buffer zone of 250m around the ponds where GCN were present in their terrestrial phase, approximately 0.3ha of habitat for the species would be affected by site clearance for Main Construction, as shown in figure D9-4 (Application Reference Number: 6.4.101). The affected habitats within the 250m buffer are dominated by short-grazed improved pasture and are generally considered to be sub-optimal for sheltering or foraging GCN. Due to the quality of the habitat and the medium-term duration of the habitat loss (up until the end of Main Construction), the effects of habitat loss and fragmentation are expected to be limited.

9.5.176 In addition to the specific mitigation undertaken for the EPSML, the implementation of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would lead to the creation of suitable habitats for GCN that would result in a long-term positive effect. This would include the creation of permanent or seasonally wet water bodies, areas of damp ground, boundary features, woodland, and species-rich grassland across the Wylfa Newydd Development Area. The provision of terrestrial habitats suitable for GCN within 500m of the Cae Gwyn SSSI meta-population breeding ponds has been a key factor in the design of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Coarse sward species-rich grassland would be planted, providing approximately 0.3ha of this habitat within 250m of the of the Cae Gwyn SSSI meta-population breeding ponds, and 6.6ha of this habitat between 250m and 500m of the meta-population breeding ponds. This is considered to be an improvement in the habitat quality which currently existing within these areas.

9.5.177 There would be no permanent loss of terrestrial habitat within 250m of GCN ponds. The Wylfa Newydd Development Area does not intersect with any core GCN habitat (i.e. habitat within 50m of GCN ponds). There would be no loss of GCN ponds because of Main Construction.

9.5.178 With the implementation of the mitigation outlined in the EPSML and the habitat enhancements described in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), the magnitude of change due to habitat loss or fragmentation would be negligible and so a negligible effect is predicted.

Common toad

9.5.179 Effects on common toads within the Wylfa Newydd Development Area have been identified via the following pathways:

- mortality and injury; and
- habitat loss and fragmentation.

Mortality and injury

9.5.180 There is the potential for mortality and injury effects to occur during pond destruction, topsoil stripping, vegetation removal and the removal of dry stone walls. Toads could also be killed or injured by machinery movements or through entrapment in excavations.

9.5.181 Good practice mitigation would comprise the trapping and translocation of toads from suitable habitats. Vegetation removal would be undertaken in a directional manner to encourage toad movement towards suitable retained habitats. An ECoW would also supervise the removal of suitable habitat, with any captured toads being translocated to a receptor site.

9.5.182 With the application of these good practice methods, the magnitude of change is expected to be negligible and so mortality and injury effects are predicted to be negligible.

Habitat loss and fragmentation

9.5.183 Four ponds supporting breeding common toad within the Wylfa Newydd Development Area would be lost. All terrestrial habitats within the Wylfa Newydd Development Area suitable to support common toad would also be lost following vegetation and topsoil clearance.

9.5.184 Fragmentation effects would arise as there are areas that support common toad (such as habitat in the Tre'r Gof SSSI) which would be isolated from the wider landscape as a result of construction activities. Fragmentation would make the population more susceptible to localised extinction resulting from chance events (e.g. flooding or pollution).

9.5.185 The removal of many habitats would be temporary in the short- and medium-term. In the long-term, the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would deliver the reinstatement, creation and enhancement of habitats of value for common toad, including: approximately 20ha of woodland; approximately 10ha of marshy wet grassland; and approximately 10km of hedgerow. The creation of field boundaries using traditional materials, the creation of new ponds, and the provision of species-rich grassland would also benefit common toad by providing habitats for breeding, foraging, sheltering, and hibernating.

9.5.186 Given the proposed embedded mitigation, the magnitude of change is predicted to be small, meaning that the effects of habitat loss and fragmentation would be negligible. Additional mitigation is described in section 9.6.

Adder and common lizard

9.5.187 Potentially significant effects on adder and common lizard within the Wylfa Newydd Development Area have been identified via the following pathways:

- mortality and injury;
- habitat loss and fragmentation; and
- disturbance.

Mortality and injury

9.5.188 All activities that involve the clearance of areas containing suitable reptile habitat could result in mortality and injury of adder and common lizard, with the risk increasing in areas of known reptile presence, i.e. sites 2, 7 and 22 (see appendix D9-10, Application Reference Number: 6.4.43), and high

potential reptile habitat (e.g. cloddiau, marshy grassland, disturbed land, scrub, coastal grassland, tall ruderal).

9.5.189 Good practice mitigation for adder and common lizard would be in place prior to site clearance activities commencing, as outlined in section 9.4. This would include a combination of trapping and translocation of individuals, phased and directional habitat manipulation to encourage reptiles to move away from the works area, sensitive removal of suitable refuge features, and supervision of works by an ECoW. This mitigation would be undertaken during the reptile active season (between March and October inclusive, dependent on local weather conditions) in accordance with good practice guidelines [RD60]. Full information is provided in the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

9.5.190 Translocated reptiles would be released at a receptor site. The site comprises a 5ha area of grassland and scrub located adjacent to the Wylfa Newydd Development Area that is being enhanced for reptiles. This area has been secured by Horizon for 15 years, which would cover the full construction period, and would provide a source population for re-establishment of reptiles following the establishment of habitats proposed within the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). The receptor site, in optimum condition, is considered to be sufficient to support the low population of reptiles identified across the Wylfa Newydd Development Area. However, should more animals be found than anticipated, the notable wildlife receptor site (at 15ha) would be used as a supplementary site (see figure D9-9 (Application Reference Number: 6.4.101) for location and section 9.6 for an explanation of this site).

9.5.191 The location of the proposed 5ha receptor site, the habitats that it supports, and the proposed habitat enhancements are illustrated by figure D9-8 (Application Reference Number: 6.4.101).

9.5.192 Based on the implementation of good practice mitigation, a negligible magnitude of change is anticipated and so effects as a result of mortality and injury would be negligible.

Habitat loss and fragmentation

9.5.193 Approximately 12ha of suitable reptile habitat (e.g. marshy grassland, disturbed land, scrub, coastal grassland, fen, tall ruderal) and approximately 12km of suitable field boundaries (i.e. cloddiau and species-poor hedges) would be removed. In context of the total habitat losses of approximately 276ha, potential reptile habitats are localised and small within the Wylfa Newydd Development Area.

9.5.194 Habitat fragmentation would also be likely due to the isolation of habitats between the northern boundary of the Wylfa Newydd Development Area and the coast. This may increase the vulnerability of populations in these areas to localised extinction from chance events, e.g. fire or flood.

9.5.195 The removal of many habitats would be temporary in the short and medium-term as the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) include the reinstatement, creation and

enhancement of habitats that would be suitable for reptiles, including: approximately 10ha of coastal heath/grass mosaic; 10ha of marshy wet grassland; 10km of hedgerow; and field boundaries using traditional materials. Approximately 20ha of new woodland would also be planted and whilst this habitat itself is unlikely to be of value for reptiles, the extensive areas of edge habitat would be utilised by reptiles, especially where these intersect with areas of sympathetically managed grassland.

9.5.196 In addition to the above, habitat loss would also be mitigated through the provision and management of the dedicated receptor site.

9.5.197 The magnitude of change is therefore predicted to be small and so a negligible effect of habitat loss and fragmentation is expected during construction. Additional mitigation is described in section 9.6.

Disturbance

9.5.198 During the construction period, there would be disturbance caused by groundworks excavations and vehicle movements.

9.5.199 There are limited scientific publications that evaluate the impact of human disturbance on reptiles, and there is no strong evidence that reptiles are sensitive to disturbance, although there is potential that disturbing activities could cause stress to individual animals and compromise survival and reproduction rates.

9.5.200 By the time highly disturbing activities commence (e.g. topsoil stripping, deep excavation, blasting), most of the reptiles within the Wylfa Newydd Development Area would have dispersed or been removed as part of the mitigation strategy outlined above. However, the effects of disturbance could be experienced by reptiles within retained habitats in the immediate vicinity (e.g. reptile sites 15 and 16, as shown in appendix D9-10, Application Reference Number: 6.4.43).

9.5.201 Baseline surveys identified low populations of reptiles within the targeted areas subject to surveys. Reptiles are mobile animals, and as refuges such as drystone walls would be retained within habitats adjacent to the Wylfa Newydd Development Area, it is expected that any reptiles within the areas affected would be able to seek shelter, should this be necessary.

9.5.202 Good practice mitigation measures to reduce noise generated by construction activity would also be implemented, as described in chapter D6 (Application Reference Number: 6.4.6).

9.5.203 Based on the above, the magnitude of change is predicted to be minor and so impacts of disturbance to reptiles are expected to be negligible.

Chough

9.5.204 Potentially significant effects on chough have been identified via the following pathways:

- habitat loss and modification; and
- disturbance.

9.5.205 There is also potential for significant effects to SPAs for which chough is a qualifying feature and where significant functional linkages may exist between these sites and chough within the Wylfa Newydd Development Area. However, based on the assessment of functional linkages provided in appendix D9-14 (Application Reference Number: 6.4.47), there are considered to be no significant functional linkages between SPA populations of chough and individuals using the Wylfa Newydd Development Area. This conclusion is consistent with the findings of the Shadow HRA Report (Application Reference Number: 5.2). As such, impact pathways on SPAs with chough as a qualifying feature are not considered further in this assessment.

Habitat loss and modification

9.5.206 The ecology, and in particular the diet, of chough is well understood e.g. Whitehead *et al.* (2005) [RD61], with suitable nesting sites and the provision of short grassland for foraging being critical factors for the success of a population. Effects to nest sites and foraging habitat (during the breeding and non-breeding periods) are therefore key considerations.

Effects to nesting chough

9.5.207 There would be no loss of any of the four historic chough nesting sites within the Wylfa Newydd Development Area as a direct result of Main Construction, Marine Works or construction, operation and decommissioning of the Site Campus, as these are all located outside the footprint of the proposed works areas (see appendix D9-14, Application Reference Number: 6.4.47).

9.5.208 No other suitable chough nesting habitats would be directly affected by construction activities.

Effects to foraging chough during the breeding season

9.5.209 Chough are susceptible to the loss of habitat used for foraging. Kerbiriou *et al.* (2006) [RD62] found that foraging activity usually took place close to nests and was mainly within 300m. The quality of habitat within 300m has been shown to directly influence breeding success, with fecundity directly related to the ratio of foraging habitat with sward heights less than 5cm within this distance [RD62]; [RD63].

9.5.210 Whilst Kerbiriou *et al*. (2006) [RD62] demonstrates the importance of the core foraging area (which is mainly within 300m of the nest site), the baseline surveys also show specific areas of well-used foraging habitat up to 1.5km from the nest sites, although these habitats are often extremely localised and comprise micro-habitats within much larger fields e.g. rock outcrops, clifftops. The baseline surveys indicate that the areas used most by foraging chough during the breeding season are the coastal grasslands around Wylfa Head. Grassland at Trwyn Penrhyn Wildlife Site (and nearby rocky outcrops) and Trwyn Pencarreg Wildlife Site are also utilised, although to a lesser degree than the habitats closer to Wylfa Head (appendix D9-14, Application Reference Number: 6.4.47).

9.5.211 The core foraging area 1.5km from nest sites covers approximately 54ha, and approximately half of this would be lost as a result of Main Construction,

Marine Works and construction of the Site Campus, including well-used habitats to the immediate south-east of Wylfa Head that would be affected by construction of the Site Campus. However, well-used foraging areas of grassland at Trwyn Penrhyn Wildlife Site, Trwyn Pencarreg Wildlife Site and Wylfa Head would be retained (appendix D9-14, Application Reference Number: 6.4.47).

9.5.212 Good practice mitigation would ensure the retention and protection of these habitats through the provision of temporary construction fencing.

9.5.213 Embedded mitigation at Mound A is also proposed, with the parts of this feature that are closest to the Wylfa Head nest site being managed for the benefit of chough with the grassland regularly mown or grazed to maintain a short sward. At its closest point, the mound is approximately 700m from the Wylfa Head nest site and approximately 650m from the nest site at the Existing Power Station. Mound A is within the distance between the nest sites and foraging habitat at Trwyn Pencarreg (1.6km) which baseline surveys have identified as being part of the well-used foraging area. It is therefore considered likely that the Wylfa Head breeding chough would utilise suitable habitat on Mound A.

9.5.214 The removal of most habitats would be temporary in the short- and medium-term as the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) include the reinstatement, creation and enhancement of habitats that would be suitable for chough. Most notably, on completion of the construction period, the Site Campus would be decommissioned and the site reinstated with close-sward species-rich coastal grassland.

9.5.215 The provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would create habitats of higher value for foraging chough than the habitats currently present within the Wylfa Newydd Development Area. For example, approximately 20ha of close-sward species-rich grassland, 100ha of coarse-sward species-rich grassland and 10ha of coastal heath/grass mosaic would be created and appropriately managed; this habitat would also likely see an increase in invertebrate biomass and thus benefit foraging chough. Agricultural grassland would also be sympathetically managed for foraging chough, where appropriate. Additional mitigation would also enhance habitats at Wylfa Head (see section 9.6).

9.5.216 Despite the above, the loss and modification of core habitat has the potential to adversely affect breeding success during the construction period. In a worst case scenario, the reduction in the quality of core habitat could lead to the loss of a breeding population of chough from the Wylfa Newydd Development Area, especially when combined with other pressures (e.g. sub-optimal habitat quality at Wylfa Head due to a recent reduction in grazing).

9.5.217 The loss of core habitat is therefore considered to result in a medium magnitude of change and so a moderate adverse effect is predicted. Additional mitigation is proposed and is described in section 9.6.

Effects to foraging chough during the non-breeding season

9.5.218 Outside the breeding season, chough are known to congregate at traditional roost sites and forage up to 6km from these locations through the winter months (appendix D9-14, Application Reference Number: 6.4.47). Baseline data from surveys in winter 2017 show from colour band sightings that the pair of chough which breed at Wylfa Head are also present in the area during the non-breeding season. These birds are therefore likely to be resident in the Wylfa Head area throughout the year. However, due to the tendency for chough to range more widely outside the breeding season, the relative importance for the Wylfa Head breeding population of non-breeding season foraging habitat near to the nest sites is likely to be reduced.

9.5.219 However, the baseline non-breeding surveys in other years have also shown the distribution of non-breeding chough as similar to that during the breeding season. It is therefore assumed that the Wylfa Head breeding population of chough rely on the same habitats during the non-breeding season as in the breeding season and, as such, the main pathway to effects during the non-breeding season would be the loss of foraging habitats.

9.5.220 The nearest non-breeding season chough roost site to the Wylfa Newydd Development Area is at Church Bay, approximately 6km to the southwest. The baseline data from the non-breeding season recorded a maximum of six chough within the study area. Surveys during the non-breeding period generally recorded approximately four birds within the field survey study area, which are likely to be from the Wylfa Head breeding population. The low numbers of non-breeding chough recorded within the Wylfa Newydd Development Area, the distance from the Church Bay roost, and the availability of alternative suitable habitats elsewhere along the coast suggest that the habitats within the Wylfa Newydd Development Area are not of significant value for non-breeding birds from other populations.

9.5.221 Although the majority of habitats within the Wylfa Newydd Development Area would be lost, the majority of the foraging habitats used by chough would be retained and the resulting landscape would still offer opportunities for foraging chough (breeding and non-breeding). For example, habitats at Trwyn Pencarreg Wildlife Site, Trwyn Penrhyn Wildlife Site, and the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site would be retained, and the landscape mounds capped with topsoil and reseeded through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Habitat affected by the Site Campus and temporary construction work areas would also be reinstated as close-sward species-rich grassland or coastal heath/grass mosaic.

9.5.222 Furthermore, the topsoil stripped areas elsewhere within the Wylfa Newydd Development Area may provide temporary opportunities for foraging chough as these birds have been recorded to make use of similar conditions (e.g. recently ploughed fields and areas stripped for archaeological investigation (Horizon Environmental Coordinator Observation pers. comm.), albeit rarely [RD64]; [RD63]. In the medium- to long-term, the implementation of the Landscape and Habitat Management Strategy (Application Reference

Number: 8.16) would see these areas restored to close-sward species-rich grassland habitat suitable for foraging chough.

9.5.223 As is the case for the breeding season, the loss of core habitat is considered to result in a medium magnitude of change and so a moderate adverse effect is predicted. Additional mitigation is proposed and is described in section 9.6.

Disturbance

9.5.224 The pathways by which disturbance effects could occur include noise, vibration and visual disturbance. Chough that breed in retained habitats immediately adjacent to the Wylfa Newydd Development Area are considered to be particularly susceptible. The key areas for foraging chough are short grassland habitats within their core foraging range in both breeding and non-breeding seasons, in particular the coastal grasslands around Wylfa Head and Trwyn Pencarreg Wildlife Site. Chough in these areas are also considered to be most susceptible to disturbance.

9.5.225 Main Construction, Marine Works (i.e. Cooling Water System, Cooling Water System intake and outfall, Marine Off-Loading Facility (MOLF) and breakwater structures) and activities associated with construction, operation and decommissioning of the Site Campus would result in changes to noise and visual stimuli through activities such as the operation and movement of machinery, demolition of buildings and structures, excavation, blasting and the change in the number, distribution and activities of people. Activities undertaken during the breeding season between mid-March and August are considered likely to result in potentially significant disturbance effects at the nest and during foraging. Activities during the non-breeding season could result in potentially significant disturbance to foraging.

9.5.226 Chough can be vulnerable to disturbance from human activities, especially in the vicinity of nest sites and core feeding areas [RD62]. Noise has been demonstrated to cause behavioural effects upon birds, varying depending upon the time of year. The potential effects of noise disturbance to birds are described by various studies and have been summarised by Latimer *et al.* (2003) [RD65], although no specific information relating to threshold levels of noise disturbance upon chough is available. However, tolerance of chough to noise disturbance is predicted to be high given that nest site A is within a building which is part of the Existing Power Station and is subject to noise associated with its operation (including fire alarm tests and stack venting). Chough are considered to be generally resilient to disturbance as long as the disturbing factors are regular and present prior to breeding attempts, or occur later in the breeding period after the initial set up of breeding territories (Adrienne Stratford (Welsh Chough Project) / RSPB pers. comm. in March and June 2017). A ‘new’ disturbance event during the early stages of the breeding season can cause birds to desert the nest site for the season, whereas a similar level of disturbance taking place further in to the breeding season is much less likely to have an adverse effect.

9.5.227 Several studies have been undertaken to measure the effects of visual disturbance to birds (e.g. see [RD49]; [RD66]; [RD67]), although the subjects of these studies do not specifically relate to chough. The distance at which individual birds display behaviours associated with disturbance varies

considerably by species and by type of disturbance. The significance of visual disturbance may also be greater when combined with noise disturbance, although this has not been studied with respect to chough [RD65]. Visual disturbance caused by anglers standing on cliffs close to nest site C was considered to have caused the abandonment of the nest site (pers. comm. Adrienne Stratford). However, the timing of this disturbance is considered to have been critical (April), with birds in the process of establishing the nest at the time. Baseline surveys have recorded only one event where foraging chough were disturbed by anthropogenic causes, when chough flying towards a foraging area veered away when a group of eight people with dogs were adjacent to the area being approached. However, chough were also recorded foraging within fields occupied by people, and sometimes within 50m of people. Chough have also been recorded during baseline surveys foraging on banks adjacent to existing car parks and buildings within the Existing Power Station area.

9.5.228 The Wylfa Newydd Development Area is subject to a number of disturbance events above that considered normal in an agricultural environment. There are vehicle movements in association with site security, regular fly-bys of low flying RAF jets (regularly generating noise above 85dB (see appendix D13-13 Noise at Marine Ecological Receptors, Application Reference Number: 6.4.95), and in recent years there have been a number of activities to facilitate ground investigation and archaeological trial trenching. The Wales Coastal Path on Wylfa Head also brings people into close contact with nest sites and core foraging habitat. Chough within the Wylfa Newydd Development Area are therefore currently exposed to many, and sometimes very noisy, short-term disturbance events.

9.5.229 The timing of potentially disturbing effects on chough is particularly important. Chough are considered to be generally resilient to disturbance as long as the disturbing factors are regular and present prior to breeding attempts, or occur later in the breeding season. However, a ‘new’ disturbance event during the very early stages of the breeding season can cause birds to desert the nest site for the season i.e. the anglers example, above (RSPB/Adrienne Stratford pers. comm.).

9.5.230 The results of noise modelling suggest that construction of the Site Campus and Cooling Water System would generate the greatest potential for disturbance within the vicinity of chough nest sites and core foraging habitat. Construction of the Site Campus would take approximately two years and it would be operational until Year 10 before being decommissioned. The operation of the Site Campus would also likely result in noise and visual disturbance due to up to 4,000 workers living there. The Cooling Water System would take approximately three years to construct. The effects of disturbance are therefore temporary in the medium-term.

9.5.231 Noise modelling (see chapter D6, Application Reference Number: 6.4.6) predicts the worst case construction noise levels to be approximately 65dB $L_{Aeq,1\text{-}hour}$ at the historic nest sites within the Existing Power Station (nest site A); approximately 85dB $L_{Aeq,1\text{-}hour}$ at nest site B; approximately 61dB $L_{Aeq,1\text{-}hour}$ at the nest sites on Wylfa Head (nest sites C and D); and up to approximately 85dB $L_{Aeq,1\text{-}hour}$ within core foraging habitats.

9.5.232 At each of the key areas for chough, there would be an increase in noise above baseline levels during construction activities and so the effects of disturbance are possible.

9.5.233 The evidence described above suggests chough are tolerant of high noise levels (at certain times). The predicted noise levels at nest site A are expected to be within acceptable limits given the high levels of noise disturbance already experienced at this location and the attenuation that the building would provide from noise generated outside of it. Chough have made only one unsuccessful nesting attempt at nest site B in 2009 and so the predicted noise levels at this location are not anticipated to adversely affect nesting behaviour as chough are unlikely to be present. The predicted noise levels at Wylfa Head (nest sites C and D) are expected to be within acceptable limits given the existing background noise experienced at these locations (e.g. waves crashing on cliffs; RAF jets exceeding 85dB). As such, noise disturbance is not expected to adversely affect chough at their nesting sites.

9.5.234 Noise levels above baseline conditions may disturb foraging chough that are intolerant of such levels. It is anticipated that these birds would be displaced to retained habitat beyond the area of disturbance during its duration.

9.5.235 Visual disturbance would occur in areas of retained habitats within and adjacent to the Wylfa Newydd Development Area. The effects of visual disturbance from mobile construction teams would vary spatially and temporally, depending on the activity being undertaken. Temporary construction lighting may also disturb chough in retained habitats. Foraging chough that are not tolerant of visual disturbance are expected to be displaced to adjacent retained habitat that would be protected during the construction period. Newly created foraging habitat at Mound A would also provide an alternative resource, as discussed above.

9.5.236 Disturbance of habitats is also possible due to increased footfall on the headland caused by workers residing in the Site Campus using the area for recreation. This could result in the avoidance of foraging habitat by chough.

9.5.237 Embedded mitigation in the form of the landscape mounds would reduce the effects of noise disturbance, although noise levels above baseline conditions would be experienced throughout the entire construction period. The landscape mounds would also provide visual screens between foraging areas at Trwyn Pencarreg Wildlife Site and construction areas to the east.

9.5.238 Good practice guidelines with respect to noise control would be adhered to during construction, as outlined in chapter D6 (Application Reference Number: 6.4.6). Good practice mitigation, enforced by the ECoW, would also seek to ensure that construction noises would not be started at the critical nest establishment stage and would be at levels that chough have habituated to from other sources.

9.5.239 Additional mitigation is also proposed to address the spatial and temporal variations in disturbance so that chough have sufficient alternative foraging sites. Additional mitigation to reduce possible disturbance caused by lighting and the use of Wylfa Head for recreation by workers residing in the Site Campus is also proposed (see section 9.6).

9.5.240 Based on the above, the magnitude of change would be medium, the effect of disturbance to chough would be moderate adverse. Additional mitigation is proposed, as described in section 9.6.

Combined effects

9.5.241 With the application of embedded and good practice mitigation it is predicted that moderate adverse effects would occur as a result of both foraging habitat loss and disturbance. There is the potential that these two effects could combine to affect chough, but it is not considered that they would result in a greater magnitude of change than that already predicted, and therefore the overall effect would be moderate adverse.

Breeding birds

9.5.242 Potentially significant effects on breeding birds have been identified via the following pathways:

- mortality and injury of species;
- habitat loss and modification;
- hydrological changes; and
- disturbance.

Mortality and injury

9.5.243 The mortality and injury of species could occur during all vegetation clearance and removal of other above-ground features (e.g. dismantling of stone walls) and potentially during topsoil stripping. Mortality and injury could occur to adults and dependent young and via destruction of eggs. The effects to nests and eggs could occur to both tree/scrub and ground-nesting species, e.g. meadow pipit (*Anthus pratensis*) and skylark *(Alauda arvensis)* that have been frequently recorded in the field survey study area. Effects could also extend to marine and coastal species such as oystercatcher (*Haematopus ostralegus*) or ringed plover *(Charadrius hiaticula)* that may be attracted to newly-created bare ground habitat within the Wylfa Newydd Development Area.

9.5.244 Good practice mitigation would be implemented by timing vegetation clearance works to avoid the main breeding season, as per the provisions of the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). An ECoW would also supervise unavoidable works affecting suitable nesting habitats during the breeding season, including pre-demolition inspection of the non-breeding barn owl roost locations at Tyddyn-Gele and The Firs.

9.5.245 This mitigation would see that there is a negligible magnitude of change and so the potential effects of mortality and injury on breeding birds would be negligible.

Habitat loss and modification

9.5.246 Vegetation and topsoil clearance works would remove the majority of habitat suitable for breeding birds from within the Wylfa Newydd Development Area.

9.5.247 There are no known barn owl breeding sites that would be destroyed as a result of the Wylfa Newydd Project. Baseline surveys show that the nearest breeding sites are at Mynydd Ithel, Caerdegog Isaf, and the wildlife tower at Cafnan Farm, all of which would be retained. Occasional barn owl roosts would be lost at Tyddyn-Gele and The Firs; these would be checked for barn owl by an ECoW prior to their demolition. If active nests were encountered prior to demolition, all activity likely to affect the nest site would be delayed until the nest fell into disuse; in this instance, appropriate replacement roosts would also be provided in the form of pole mounted barn owl boxes, or similar.

9.5.248 The effects of habitat loss are limited as the types of habitat that would be lost are widely available to breeding birds within the wider landscape. The removal of many habitats would be temporary in the short- and medium-term as the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) include the reinstatement, creation and enhancement of habitats that would be suitable for breeding birds, including approximately 20ha of woodland and 10km of species-rich hedgerow. Most notably, the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would deliver the creation of habitats of higher value for foraging birds than the habitats currently present within the Wylfa Newydd Development Area. For example, approximately 20ha of close-sward species-rich grassland, 100ha of coarse-sward species-rich grassland and 10ha of marshy wet grassland, in addition to the new woodland and enhanced hedgerow habitats, would likely see an increase in invertebrate biomass and thus benefit breeding birds. Similarly, the creation of species-rich grassland would also benefit seed-eating species.

9.5.249 The direct loss of foraging, nesting and roosting habitat would be a small magnitude of change for the species using the Wylfa Newydd Development Area and so a negligible effect is predicted. Additional mitigation is proposed, described in section 9.6 below.

Hydrological changes

9.5.250 Hydrological effects in the form of accidental pollution during the construction period would potentially result in degradation of retained habitats. Pollution events in water bodies could affect a number of species of bird including notable species such as mallard *(Anas platyrhynchos)*, teal *(Anas crecca)* and wigeon *(Anas penelope)*, although birds would be able to relocate to suitable habitats nearby.

9.5.251 Good practice mitigation (delivered through the Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)) includes buffer zones around Nant Cemlyn, Afon Cafnan, Nant Caerdegog Isaf, Nant Cemaes, and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI. The Surface Water and Groundwater Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) would also seek to ensure that good practice mitigation in the form of pollution control measures is implemented.

9.5.252 As such, a negligible magnitude of change would arise and so hydrological changes are predicted to have a negligible effect.

Disturbance

9.5.253 The pathways by which disturbance effects could occur include noise, vibration and visual disturbance. Species that breed in retained habitats immediately adjacent to the Wylfa Newydd Development Area are considered to be particularly susceptible.

9.5.254 Disturbance of breeding birds could adversely affect the survival, range and abundance of certain species, although susceptibility to disturbance does vary between species, from total avoidance through to rapid habituation (e.g. see [RD65]; [RD49]).

9.5.255 Following vegetation clearance and removal of other above-ground features, it is highly likely that only breeding birds in habitats around the boundary of the Wylfa Newydd Development Area would be affected, unless species nest on bare ground habitats or temporary construction infrastructure.

9.5.256 Noise is considered to be a major cause of disturbance and, as shown in chapter D6 (Application Reference Number: 6.4.6), noise contour mapping indicates that there are several areas outwith the Wylfa Newydd Development Area where the worst case noise levels would exceed 55dB $L_{Aeq,1\text{-}hour}$. In these areas, habitats would not have been removed and so effects would be experienced by extant bird populations.

9.5.257 The effects of noise would be localised and temporary (medium-term) and so are not likely to alter the long-term population status of any of the species or assemblages in the local area.

9.5.258 There are barn owl breeding sites at Cafnan Farm, Caerdegog Isaf Farm and at Mynydd Ithel Farm. The results of the noise monitoring detailed in appendix B6-1 Baseline noise monitoring (Application Reference Number: 6.2.20), indicate that the baseline noise levels for these sites are between 40-48 dB $L_{Aeq,T}$ during the day and 30-40 dB $L_{Aeq,T}$ during the night (see chapter D6, Application Reference Number: 6.4.6).

9.5.259 Noise modelling predicts that the worst case construction noise levels during the periods modelled (see chapter D6) (Application Reference Number: 6.4.6) at Cafnan Farm would be approximately 79dB $L_{Aeq,1\text{-}hour}$ between October and December 2020 (day time), and approximately 79dB $L_{Aeq,1\text{-}hour}$ between April and June 2027 (night time).

9.5.260 At Caerdegog Isaf Farm and Mynydd Ithel Farms, the predicted worst case levels during the construction period would be approximately 65dB $L_{Aeq,1\text{-}hour}$ and 63dB $L_{Aeq,1\text{-}hour}$ respectively, between July and September 2020 (day time) and April and June 2027 (night time).

9.5.261 At each of the three breeding sites, there would be an increase in noise above baseline levels during construction activities and so the effects of disturbance are possible.

9.5.262 Barn owl can be tolerant of human activity, although disturbance at the nest can lead to nest failure or desertion. Desertion due to disturbance may also occur more commonly in those years when the birds are already stressed by food shortage [RD68]. A literature review by Scottish Natural Heritage suggested that barn owl can be sensitive to disturbance within 50 to 100m of

the source, although some contact with humans due to barn owl selection of active farm buildings suggests both a high degree of tolerance by at least some pairs and that conditioning to certain types or levels of disturbance can occur [RD68]. There is limited information available relating to barn owl thresholds of tolerance to noise disturbance.

9.5.263 Cafnan Farm, Caerdegog Isaf Farm and Mynydd Ithel Farm are working farms that would be subject to regular noise and visual disturbance and so it is assumed that the birds here are reasonably tolerant of disturbance; this assumption is supported by the successful breeding of barn owl at Caerdegog Isaf in 2017 despite (third party) works involving the replacement of a building's roof at the site (pers. comm. with Horizon Environmental Coordinators).

9.5.264 Embedded mitigation in the form of the landscape mounds would reduce the effects of noise disturbance, although noise levels above baseline conditions would be experienced throughout the entire construction period. However, the landscape mounds would also provide visual screens between the roost sites and construction areas.

9.5.265 Despite Mound D1 acting as an acoustic barrier, there is still potential for abandonment of roosts at Cafnan Farm, Mynydd Ithel Farm or Caerdegog Isaf Farm, and so additional mitigation is proposed.

9.5.266 Regular and occasional barn owl roosts at Plas Cemlyn, Pen Carreg, and Neuadd would all be retained and could act as alternative breeding sites during periods of disturbance at Caerdegog Isaf Farm, Mynydd Ithel Farm and Cafnan Farm (see appendix D9-12 for locations, Application Reference Number: 6.4.45). As such, the local area is expected to retain its capacity to support the current population of two breeding pairs of barn owl. However, additional mitigation is proposed to address the spatial and temporal variations in disturbance so that barn owls have sufficient alternative roosting sites (see section 9.6).

9.5.267 Visual disturbance to birds would occur in areas of retained habitats within and adjacent to the Wylfa Newydd Development Area. The effects of visual disturbance from mobile construction teams would vary spatially and temporally, depending on the activity being undertaken. Temporary construction lighting may also disturb breeding birds in retained habitats. However, the effects would be mitigated by the landscape mounds and so would be temporary up until the point of their construction, or until the species habituates to the disturbance.

9.5.268 Disturbance is predicted to result in a medium magnitude of change and a minor adverse effect, although additional mitigation is proposed (see section 9.6).

Over-wintering and passage birds

9.5.269 Potentially significant effects on over-wintering and passage birds during construction have been identified via the following pathways:

- mortality and injury;
- habitat loss and modification;

- hydrological changes; and
- disturbance.

Mortality and injury

9.5.270 The mortality and injury of species could occur during all vegetation clearance and removal of other above-ground features (e.g. dismantling of stone walls) and potentially during topsoil stripping.

9.5.271 The potential for mortality and injury of species during the winter period is likely to be low because birds would not be confined to nest sites and are likely to move away from sources of disturbance. However, some species do not take flight until the last second when startled or disturbed. For example, snipe typically takes-off only once a potential predator is within 10m–15m; or woodcock, that remains in cover during the day [RD69]. In all likelihood, even these species would still escape safely as potentially harming activities would typically be slow moving and would be preceded by noise and visual disturbance that would flush birds away.

9.5.272 A negligible magnitude of change is predicted and so effects would be negligible.

Habitat loss and modification

9.5.273 The baseline shows that nearly all habitats within the Wylfa Newydd Development Area are used for foraging and roosting by over-wintering and passage birds.

9.5.274 Virtually all habitats within the Wylfa Newydd Development Area (excluding retained habitats and buffer areas) would be removed. The effects of this would vary between species e.g. some ground foraging species may persist (especially once areas of grassland on the landscape mounds establish), whilst hedgerow species are likely to be displaced.

9.5.275 Overall, effects are predicted to be lessened due to the generally low quality of the habitat within the Wylfa Newydd Development Area, being dominated by improved agricultural grassland. Although this habitat can be important for some birds, such as over-wintering foraging geese, it has limited conservation value for the majority of over-wintering bird species recorded during the surveys.

9.5.276 Baseline surveys show that most notable wintering bird species were recorded in the following areas: south of Cemlyn Bay; on semi-improved coastal grassland and heathland south of Cerrig Brith; on semi-improved neutral grassland at Mynydd Ithel, south of the Wylfa Newydd Development Area; and, on marshy grassland around Tregele (see appendix D9-13, Application Reference Number: 6.4.46). None of these areas would be directly affected by habitat loss or modification.

9.5.277 The loss of foraging and roosting habitat would only be permanent for the area under the footprint of the Power Station and associated infrastructure, which mainly comprises semi-improved grassland. The remaining habitat would be replaced in the medium- to long-term by the implementation of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16),

with short-term effects generally mitigated by the availability of similar habitat in the wider landscape with the potential to support over-wintering and passage birds. The reinstatement, creation and enhancement of habitats that would be suitable for over-wintering and passage birds, includes: approximately 20ha of woodland; approximately 40ha of improved agricultural grassland; approximately 20ha of close-sward species-rich grassland; approximately 100ha of coarse-sward species-rich grassland; approximately 10ha of marshy wet grassland; and approximately 10km of hedgerow.

9.5.278 Given the above, a small magnitude of change is expected and so a negligible effect would occur as a result of habitat loss and modification. Additional mitigation is described in section 9.6.

Hydrological changes

9.5.279 The potential for, and effects of, hydrological changes are as per the assessment for breeding birds above.

9.5.280 It is expected that embedded and good practice mitigation would be adequate to control the risk of hydrological changes affecting retained wetland habitats of importance for over-wintering and passage birds.

9.5.281 A negligible magnitude of change is predicted and so hydrological changes are considered to have a negligible effect.

Disturbance

9.5.282 Disturbance can adversely affect the survival, range and abundance of birds. The pathways for disturbance effects on over-wintering and passage birds are similar to those potentially affecting breeding birds, and would include temporary lighting, noise and vibration, and increased human activity within the Wylfa Newydd Development Area and adjacent areas.

9.5.283 Birds react to disturbance in different ways. Species that are susceptible to disturbance could be displaced, and prevented from foraging effectively, whilst other species could become habituated to constant levels of relatively predictable background disturbance.

9.5.284 The results of the noise monitoring detailed in appendix B6-1 (Application Reference Number: 6.2.20) indicate that the baseline noise levels for the sites of greatest value for over-wintering and passage birds are between 40-48 dB $L_{Aeq,T}$ during the day and 30-40 dB $L_{Aeq,T}$ during the night (see chapter D6, Application Reference Number: 6.4.6).

9.5.285 Noise modelling predicts the worst case construction noise levels during the winter periods modelled (see chapter D6, Application Reference Number: 6.4.6) within the areas used most by notable species. Greatest value noise levels at Cerrig Brith and around Tregele would be between approximately 70 and 75 dB $L_{Aeq,1\text{-}hour}$ between October and December 2019. During the same period, noise levels at Mynydd Ithel and south of Cemlyn Bay would be approximately 60 to 65 dB $L_{Aeq,1\text{-}hour}$, and approximately 55 to 60 dB dB $L_{Aeq,1\text{-}hour}$, respectively.

9.5.286 Noise disturbance would be reduced once the landscape mounds had been constructed. During the noisiest winter construction periods after 2019 (which

would be the period between January and March in 2023), the worst case noise levels would be as follows: approximately 55 – 60 dB $L_{Aeq,1\text{-}hour}$ at Cerrig Brith; approximately 65 to 70 dB $L_{Aeq,1\text{-}hour}$ around Tregele; approximately 55 to 60 dB $L_{Aeq,1\text{-}hour}$ at Mynydd Ithel; and approximately 45 to 50 dB $L_{Aeq,1\text{-}hour}$ to the south of Cemlyn Bay.

9.5.287 At each site, there would be an increase in noise above baseline levels during construction activities and so the effects of disturbance are possible, although birds would likely make use of similar habitats in less disturbed locations in the wider landscape.

9.5.288 Visual disturbance to birds would occur in areas of retained habitats within and adjacent to the Wylfa Newydd Development Area, although the effects would be reduced by embedded mitigation following construction of the proposed landscape mounds.

9.5.289 There is a paucity of habitats likely to support aggregations of birds within the Wylfa Newydd Development Area following the initial clearance of vegetation and topsoil stripping. The adjacent habitats which would be affected are also common and widespread within the wider landscape, and so adequate resource is available for any displaced individuals.

9.5.290 The magnitude of change is expected to be medium and so potential effects of disturbance to over-wintering or passage birds are predicted to be minor adverse. Additional mitigation is proposed in section 9.6.

Bats

9.5.291 Potentially significant effects on bats have been identified via the following pathways:

- mortality and injury;
- habitat loss and fragmentation; and
- disturbance (noise, vibration and lighting).

Mortality and injury

9.5.292 Bats could be killed or injured as a result of building demolition and tree felling, if roosts are present.

9.5.293 Figure D9.5 (Application Reference Number: 6.4.101) shows the location of roosts which would be lost through demolition (a total of 16 buildings). Measures to protect bats would be put in place in accordance with an EPSML for bats that would ensure there would be no detriment to the maintenance of the population of the species concerned at a favourable conservation status, as per Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017. A draft EPSML is provided in appendix D9-20 (Application Reference Number: 6.4.53).

9.5.294 To prevent the mortality and injury of bats, soft-stripping and hand-demolition works at known roosts would be undertaken between March and June, as per good practice guidelines [RD32]; this would reduce the likelihood of bats that are particularly susceptible to disturbance being present e.g. hibernating individuals or pups. Works would also be supervised by a licensed bat worker,

who would be present to capture any bats found and remove them to one of the bat barns or pole mounted bat boxes provided as part of the EPSML.

9.5.295 A number of trees that would be removed during the construction phase have features with the potential to support roosting bats. To confirm the presence or likely-absence of roosts, pre-felling surveys would be undertaken in accordance with good practice guidelines [RD5]. Should evidence of roosting bats be recorded, good practice mitigation would be required (e.g. appropriate timing of works, soft-felling) and, as with building demolition, works would be carried out under an EPSML with respect to bats.

9.5.296 The implementation of good practice mitigation would see that there is a negligible magnitude of change and so the effects of mortality and injury would be negligible.

Habitat loss and fragmentation

9.5.297 There are 16 buildings that support roosting bats that would be demolished as part of Main Construction (see section 9.3). The measures described within the draft EPSML would ensure there would be no detriment to the maintenance of the population of the species concerned at a favourable conservation status, as per the requirements of Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017. These include the construction of two new bespoke bat barns (see figure D9.5, Application Reference Number: 6.4.101), for which planning consent exists and construction is underway with a predicted completion date of summer 2018.

9.5.298 The two new bat barns would be buffered by 10m of native planting and connected to the wider landscape by planting and habitat enhancements, as outlined in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). In association with each barn, two telegraph poles would be installed with four bat boxes of differing designs mounted on each to enhance the roosting opportunities available within 50m of the bat barns.

9.5.299 Good practice mitigation would also be required if trees supporting bat roost potential would be lost. This would comprise the provision of bat boxes to mitigate the loss of roosting features. All works affecting tree roosts would be subject to an EPSML, as outlined in appendix D9-20 (Application Reference Number: 6.4.53).

9.5.300 Topsoil stripping and vegetation clearance would remove potential foraging habitat, including approximately 229ha of agricultural grassland, 3.6ha of marshy grassland, and approximately 5ha of woodland.

9.5.301 Habitat fragmentation would also occur following the removal of features that bats follow for foraging and commuting, especially linear features that link retained habitats within the Wylfa Newydd Development Area (such as the Tyn-y-Maes bat barn and foraging habitat at the Tre'r Gof SSSI, Dame Sylvia Crowe's Mound, and coastal grassland) with habitats in the wider landscape. This may cause a reduction in use of the Wylfa Newydd Development Area by bats in the short and medium-term, with affected bats being displaced into the wider landscape. Retention of boundary features on the outer edges of the Wylfa Newydd Development Area and the habitats created through the provisions of the Landscape and Habitat Management Strategy (Application

Reference Number: 8.16) (e.g. linear woodland planting, hedgerows, drystone walls) are likely to reduce adverse effects of habitat fragmentation in the medium- and long-term.

9.5.302 The removal of many habitats would be temporary in the short and medium-term (up until the end of Main Construction and decommissioning of the Site Campus) as embedded mitigation implemented through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) includes the reinstatement, creation and enhancement of habitats of value for bats. For example, new habitats would include approximately 20ha of woodland that would provide a near-continuous belt around the south of the proposed Power Station and would connect to existing habitats in the wider landscape as well as retained habitats within the Wylfa Newydd Development Area. This would benefit roosting, foraging and commuting bats in the long-term. In addition, field boundaries would be recreated using traditional materials and approximately 13km of species-rich hedgerow would be planted, benefiting foraging and commuting bats in the medium- to long-term.

9.5.303 Furthermore, habitats created through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) are expected to increase invertebrate biomass and so benefit foraging bats. The creation of new ponds, approximately 20ha of close-sward species-rich grassland, approximately 100ha of coarse-sward species-rich grassland, approximately 10ha of marshy wet grassland, and approximately 10ha of coastal heath/grass mosaic would all be of value for invertebrates and thus foraging bats.

9.5.304 It is predicted that roost loss would result in a negligible magnitude of change and so the effect on roosting bats would be negligible. The effects of foraging/commuting habitat loss and fragmentation would be a small magnitude of change and would have a negligible effect. Additional mitigation is described in section 6.9.

Disturbance

9.5.305 Retained and newly created roosts would not be directly affected by construction activity although their proximity to the works area means that they may be affected by disturbance caused by noise, light or vibration. Bats commuting or foraging in retained habitats within or adjacent to the Wylfa Newydd Development Area may also be affected by noise or light disturbance.

9.5.306 Noise and vibration during Main Construction, Marine Works, and construction and decommissioning of the Site Campus have the potential to disturb bats whilst they roost during the day, if roosts are located immediately adjacent to the proposed construction works area. Such disturbance may cause bats to depart from their roosts prematurely during daylight hours, increasing their exposure to predation. Hibernating bats may also be prematurely woken; this increases energy expenditure that cannot easily be replaced and so reduces their chances of surviving the winter [RD32]. Roosts may also become temporarily unsuitable for use during the period over which disturbance occurs, resulting in a temporary loss of roost sites. Noise disturbance affecting foraging bats has not been well studied although excessive noise can affect foraging efficacy in those species that hunt through ‘passive listening’ for prey

(i.e. gleaning bats) with noise also potentially impairing how bats receive echolocation responses (e.g. see [RD70]; [RD71]).

9.5.307 The results of the noise monitoring detailed in appendix B6-1 (Application Reference Number: 6.2.20) indicate that the baseline noise levels for sites supporting retained roosts are between 40-48 dB $L_{Aeq,T}$ during the day and 30-40 dB $L_{Aeq,T}$ during the night (see chapter D6, Application Reference Number: 6.4.6).

9.5.308 The Tyn-y-Maes bat barn is within an area where noise modelling predicts that the worst case noise levels during Main Construction could reach 75dB $L_{Aeq,1\text{-}hour}$ during the active season (greatest value levels predicted between April and June 2027) and 70dB $L_{Aeq,1\text{-}hour}$ during the hibernation season (greatest value levels predicted between January and March 2023). There would be an increase in noise above baseline levels during construction activities, and so the disturbance to retained roosts is possible in areas affected by these changes.

9.5.309 There is little published information relating to bat tolerance to noise disturbance. However, it is considered likely that the physical structure of a roost would provide buffering for roosting bats from noise generated by construction activities outside. The greatest potential for noise disturbance to roosting bats is likely to arise during activities directly affecting roost structures, or those within 20m of retained roosts (based on the recommended buffer zones for forestry work [RD72]). Noise generating activities would vary spatially and temporally and so roost structures would not be subject to constant above-baseline levels of noise for the entire period of Main Construction. There is published research indicating studies have not found any correlation of effects between limiting noise outputs and the activity of bats at roosts or in important habitats [RD73]. It has therefore not been attempted to assign threshold levels above which disturbance is predicted.

9.5.310 Main Construction works would largely be restricted to daytime activities, which would avoid the sensitive emergence and re-entry times for bats using retained roosts. Daytime works would also avoid disturbance during foraging periods when increased noise levels may affect foraging efficiency. However, night time construction activities are proposed, with some of the worst case predicted noise levels arising at night (e.g. 75dB $L_{Aeq,1\text{-}hour}$ at Tyn-y-Maes bat barn between April and June 2027).

9.5.311 Blasting events would be designed to meet the blasting vibration limits set out in appendix B6-2 (Application Reference Number: 6.2.21), and which would be included in the Wylfa Newydd CoCP and Main Power Station Site sub-CoCP (Application Reference Numbers 8.6 and 8.7 respectively). These state vibration levels shall not exceed 6mm/s peak particle velocity (PPV) for 95% of blasting events in any six-month period, and that vibration levels from any single event shall not exceed 100mm/s PPV.

9.5.312 Blasting has the potential to lead to vibration effects at the Tyn-y-Maes bat barn. There is limited published information on the potential disturbance effects of vibration on bats. A study by URS [RD74] on bats hibernating in a quarry site quotes reports which found that vibration levels up to 13.97mm/s did not have an effect on cave-dwelling hibernating bats, and other studies

have found that PPV of less than 6mm/s have no effect on bats hibernating in caves. It is therefore considered that 95% of blasting events would not affect bats roosting at the Tyn-y-Maes bat barn, and when 6mm/s is exceeded, effects would be short-term, temporary and negligible.

9.5.313 Good practice mitigation would be applied to mitigate effects of noise disturbance during Main Construction works. Primarily this would include the provision of appropriate work exclusion zones around existing roosts, thereby restricting noise and vibration effects. The exclusion zones, determined through discussion with the ECoW, would be in place at the commencement of construction, and would be designed to provide the maximum protection possible.

9.5.314 Good practice guidelines with respect to noise control would also be adhered to during construction, as outlined in chapter D6 (Application Reference Number: 6.4.6).

9.5.315 Lighting can have both positive and negative effects upon bats, depending on species. Delays to bat emergence from roosts are likely if roost exits are lit, reducing the period available for foraging [RD75]. Artificial lighting can reduce invertebrate assemblages on a site, thus affecting foraging success [RD75]. Conversely, increased lighting can be beneficial for some species of bat (e.g. noctule and pipistrelle) as they forage prey that are attracted to light [RD75]. Lighting also has a high potential for causing many species of bats (particularly broad winged, slow flying species such as long-eared and *Myotis* bats) to avoid the lit area, potentially resulting in losses of foraging and/or roosting habitats.

9.5.316 Main Construction would require temporary lighting, although much of this would not be installed until after the removal of surface vegetation (e.g. hedgerows, trees) and walls; these are the features that are primarily used by foraging bats within the Wylfa Newydd Development Area. As such, most foraging and commuting bats are expected to have been displaced from the works area by the time that most construction related lighting is introduced.

9.5.317 Within the field survey study area, bat activity hotspots were identified around the Tre'r Gof SSSI and plantation; the existing Visitor Centre; Cemlyn Road; Cestyll Gardens; Cafnan Farm; Tyddyn Gele; the two Community woodlands within Cemaes; and Foel Fawr Farm. These hot-spots were associated with the presence of trees and linear features. Dark corridors would be maintained that allow bats roosting at the retained Tyn-y-Maes bat barn to access foraging habitat at Dame Sylvia Crowe's Mound and the Tre'r Gof SSSI; this will be achieved through the retention of a 10m wide buffer strip within which no works would be permissible without additional risk assessment and method statements, and measures to reduce light spill, as per the provisions of the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). These buffer strips would be fenced appropriately to demarcate areas during construction.

9.5.318 Based on the above, the magnitude of change is expected to be small and so a minor adverse effect is predicted as a result of disturbance, although this would be reduced through the provision of additional mitigation (see section 9.6).

Otter

9.5.319 The baseline shows that otter use both freshwater and marine systems in the field survey and desk study areas. In both environments, only evidence of foraging and commuting has been recorded. The potential effects on otter, therefore, exclude mortality and injury as there would not be any excavation of a known holt or laying-up site, and subsequent risk to individual adults or their young (see appendix D9-6, Application Reference Number 6.4.39). Pre-construction surveys would be undertaken to identify any changes to the baseline situation.

9.5.320 Potentially significant effects on otter during the construction phase have been identified via the following pathways:

- habitat loss, fragmentation or modification;
- hydrological changes; and
- disturbance (noise and lighting).

Habitat loss, fragmentation or modification

9.5.321 Riparian habitat loss for foraging and commuting otter would be limited to the approximately 400m long section of Nant Caerdegog Isaf (watercourse 13) that would be realigned and 200m of the Nant Porth-y-pistyll (watercourse 6) that would be lost to the footprint of a sediment pond. Realignment of the section of Nant Caerdegog Isaf would be prior to the loss of the existing watercourse channel, so there would be no net loss or fragmentation of habitat.

9.5.322 No otter field signs were identified on the Nant Porth-y-pistyll, which is a short watercourse that does not link up with other watercourses and thus the loss of this habitat is considered to be negligible.

9.5.323 Construction would also affect intertidal habitats, especially those at Porth-y-pistyll. Construction of the Cooling Water System, breakwaters, and Marine Off-loading Facility (MOLF) would all result in the loss of rocky intertidal habitats likely to be used by foraging and commuting otter.

9.5.324 Otter make use of terrestrial habitats, although there is no baseline evidence to suggest that this commonly occurs within the field survey study area. However, the removal of linear terrestrial features, such as hedgerows and drystone walls, could further the effects of fragmentation.

9.5.325 Although Main Construction would affect habitats utilised by foraging and commuting otters, these animals would still be able to access ‘core’ habitats within the local landscape, specifically Cemlyn Lagoon and the Afon Cafnan (Watercourse 10 and 12). Although most of the habitats within the Wylfa Newydd Development Area would be heavily modified during the construction period, they would be permeable to otter movements, especially along the riparian buffer zones described above.

9.5.326 The proposed temporary bridge crossing of the Afon Cafnan (Watercourse 10) would be a clear span bridge design, thereby ensuring no fragmentation of otter habitat in this location during its installation and operation. Security fencing would not cross watercourses and so would be porous to otter

movement. No culverts of watercourses with otter records are proposed. All permanent culverts to be installed would also allow for the safe passage of otter by being an appropriate diameter and through the provision of mammal ledges designed in line with good practice guidelines (e.g. the *Design Manual for Roads and Bridges* [RD76]). No habitat loss or fragmentation of otter habitat via the installation of culverts is anticipated.

9.5.327 Otter are highly mobile species and would be expected to navigate their way around localised barriers, especially given these do not also present a high risk of mortality (such would be the case with a new road, for example). Good practice mitigation in the form of buffer zones around the Nant Cemlyn, Nant Cemaes, Afon Cafnan, Nant Caerdegog Isaf and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI would also reduce the effects of fragmentation.

9.5.328 Good practice mitigation through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would also seek to avoid long-term loss of terrestrial and freshwater habitat, although intertidal habitat loss would be permanent.

9.5.329 Given the above, the magnitude of change is predicted to be small and so a negligible adverse effect is predicted.

Hydrological change

9.5.330 Habitat degradation is a potential effect in areas where waterbodies used by otter are in close proximity to, or have hydrological connectivity with, construction work areas. These include Cemlyn Bay lagoon, the Nant Caerdegog Isaf (Watercourse 13), the Nant Cemaes (Watercourse 3) and the Afon Cafnan (Watercourse 12) (see appendix D9-6, Application Reference Number 6.4.39). Degradation effects would potentially include smothering of riparian habitats by sediment-laden runoff, and a reduction in water quality (e.g. arising from pollution events or changes in turbidity).

9.5.331 However, good practice mitigation is proposed to adequately protect retained waterbodies (see chapter D8, Application Reference Number: 6.4.8). This would include the implementation of 15m buffer zones to protect the Nant Cemlyn, Afon Cafnan, Nant Caerdegog Isaf, Nant Cemaes, and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI, and adherence to good practice measures with respect to pollution prevention.

9.5.332 Additionally, embedded mitigation in the form of a Surface Water and Groundwater Management Strategy and the Environmental Emergency Management Strategy, both contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) would adequately protect the water quality of foraging habitats at Cemlyn Bay, the Tre'r Gof SSSI and the marine environment so that these areas remain suitable for foraging otter (see chapter D8, Application Reference Number: 6.4.8).

9.5.333 Based on the implementation of embedded and good practice mitigation, the magnitude of change is predicted to be negligible and so the effects of hydrological change would be negligible.

Disturbance

9.5.334 Disturbance effects could be caused by noise, an increased human presence near to watercourses used by the species, and lighting. As no holts or lay-up sites have been identified within the Wylfa Newydd Development it is considered that the risk of disturbance to otter is minimal.

9.5.335 With good practice mitigation in the form of buffer zones around the Nant Cemlyn, Nant Cemaes, Afon Cafnan, Nant Caerdegog Isaf and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI (detailed in chapter D8, Application Reference Number: 6.4.8), the magnitude of change is predicted to be negligible and so negligible effects would arise.

Water vole

9.5.336 Potentially significant effects on water vole have been identified via the following pathways:

- mortality and injury;
- habitat loss, fragmentation or modification;
- hydrological change; and
- disturbance.

Mortality and injury

9.5.337 Mortality and injury to water vole could occur during the backfilling of Nant Caerdegog Isaf (Watercourse 13). Good practice mitigation in the form of a trapping and translocation exercise would therefore be required, completed under a conservation licence (appendix D9-19, Application Reference Number: 6.4.52).

9.5.338 The proposed temporary bridge crossing of the Afon Cafnan (Watercourse 10) would be a clear span bridge design thereby ensuring no direct effects to the banks. Micro-siting of the bridge would seek to avoid any areas of the Afon Cafnan with active water vole burrows. The same approach would be adopted for the positioning of drainage outfalls. If pre-construction surveys indicate that good practice mitigation in the form of trapping and translocation and/or habitat manipulation were required at other locations, a conservation licence would be sought from NRW with the mitigation strategy designed in accordance with good practice guidelines [RD33].

9.5.339 The above good practice and embedded mitigation would see a negligible magnitude of change and so effects of mortality and injury would be negligible.

Habitat loss, fragmentation or modification

9.5.340 Habitat loss and fragmentation could occur as a result of the backfilling of a section of the Nant Caerdegog Isaf (Watercourse 13) (see figure D9-6. Application Reference Number: 6.4.101). By programming the realignment works approximately 12 months in advance of the backfilling of this watercourse, vegetation would be established within the realigned section prior to its connection. As such, water vole would be translocated into the new section directly from the section to be backfilled and so habitat loss and

fragmentation effects would not occur as a result of the realignment. The habitat would be modified but, as described in chapter D8 (Application Reference Number: 6.4.8), the new section of watercourse would be enhanced with improved sinuosity and enhanced bankside vegetation, resulting in a negligible effect.

9.5.341 No other activities directly affecting watercourses currently supporting water vole (i.e. Afon Cafnan (Watercourses 10 and 19), Nant Caerdegog Isaf (Watercourse 13), and Watercourse 15, see appendix D9-6, Application Reference Number 6.4.39) are proposed.

9.5.342 A 200m section of the Nant Porth-y-pistyll (Watercourse 6) would be lost to the footprint of a sediment pond. No water vole signs were identified on this watercourse and the loss of this habitat is considered unlikely to affect water vole.

9.5.343 Habitat loss and fragmentation could occur during installation of temporary or permanent infrastructure. Security fencing would not cross watercourses and so there would be no loss of riparian habitat or fragmentation effects from this activity. It is not proposed to install culverts into watercourses with water vole records and so no habitat loss or fragmentation of water vole habitat as a result of this activity would arise. Temporary bridges and culverts would be installed over the Nant Cemlyn but these would be micro-sited to avoid burrows and suitable water vole habitat.

9.5.344 In the medium and long-term, habitat creation associated with the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), and the 15m wide buffer strips along the Nant Cemlyn, Afon Cafnan, Nant Caerdegog Isaf, Nant Cemaes, and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI, would benefit water vole by promoting the growth of riparian vegetation and reducing the effects of grazing and poaching by livestock.

9.5.345 A negligible magnitude of change is predicted and so effects of habitat loss, fragmentation or modification would be negligible.

Hydrological change

9.5.346 Habitat degradation of watercourses currently supporting water vole could arise e.g. from pollution events, smothering of riparian habitat.

9.5.347 Good practice mitigation is proposed to adequately protect retained waterbodies (see chapter D8, Application Reference Number: 6.4.8); this would include the implementation of 15m buffer zones to protect the Nant Cemlyn, Afon Cafnan, Nant Caerdegog Isaf, Nant Cemaes, and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI, and adherence to good practice measures with respect to pollution prevention i.e. adherence to PPGs.

9.5.348 A negligible magnitude of change is predicted and so effects of hydrological change would be negligible.

Disturbance

9.5.349 Realignment of Nant Caerdegog Isaf (Watercourse 13) could lead to disturbance effects on water vole, as the existing section would be filled in and the new section would be tied into the retained watercourse.

9.5.350 Good practice mitigation in the form of water vole translocation would remove animals from affected areas. This mitigation would be completed under a conservation licence from NRW, as outlined in appendix D9-19 (Application Reference Number: 6.4.52).

9.5.351 Good practice mitigation in the form of 15m buffer zones would be applied from watercourses where water vole have been previously recorded i.e. the Nant Cemlyn, Nant Cemaes, and drains into the Cae Gwyn SSSI.

9.5.352 A negligible magnitude of change is predicted and so effects of disturbance would be negligible.

Red squirrel

9.5.353 Potentially significant effects on red squirrel have been identified via the following pathways:

- mortality and injury;
- habitat loss and fragmentation; and
- disturbance (noise and vibration and visual).

Mortality and injury

9.5.354 Red squirrels are most likely to be affected by mortality and injury if they are in dreys when trees are felled during works, but due to the small numbers of animals estimated to be present, the likelihood of this occurring is considered to be low.

9.5.355 However, to adequately protect red squirrels from mortality and injury, good practice mitigation in the form of pre-construction surveys, supervision of works by an ECoW and timing of works to avoid the period when dependant young may be present (February to September), would be undertaken as outlined in section 9.4, and in the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

9.5.356 Taken together, these would result in a negligible magnitude of change and so negligible effects would arise.

Habitat loss and fragmentation

9.5.357 The clearance of plantation woodland would result in the loss of approximately 3ha of habitat suitable for red squirrel, although 10.5ha of plantation woodland on Dame Sylvia Crowe's Mound (including where an active drey was recorded) would be retained. The connectivity between the retained plantation woodland and habitats outside the Wylfa Newydd Development Area would be reduced as vegetation clearance would isolate the woodland.

9.5.358 Compensation for the loss of woodland habitats would be provided in the long-term by creating new areas of planted woodland (approximately 22ha) and the enhancement of retained habitats through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Areas of woodland would be planted as early as possible following bulk earthworks and would provide a near-continuous belt around the south of the

proposed Power Station and would connect to habitats in the wider landscape. Field boundaries and hedgerows would also be reinstated or established to provide connectivity between the retained woodland on Dame Sylvia Crowe's Mound, new woodland planting, and the wider landscape.

9.5.359 The magnitude of change is considered to be small as there would be partial loss of the habitat resource. A negligible adverse effect is predicted although this would not prevent red squirrel from occupying the Wylfa Newydd Development Area in the long-term. Additional mitigation is proposed in section 9.6.

Disturbance

9.5.360 Red squirrels are vulnerable to disturbance during their breeding season.

9.5.361 The area of retained plantation woodland on Dame Sylvia Crowe's Mound would be surrounded by Main Construction works. There is therefore the potential for disturbance effects in the form of noise and vibration, and from people and vehicular movements. The degree to which the colonising red squirrel population would become habituated to disturbance is difficult to predict, as there is no historical context available against which to measure change.

9.5.362 Disturbance to red squirrel would be mitigated through adherence to good practice guidelines with respect to noise minimisation (see chapter D6, Application Reference Number: 6.4.6). Pre-construction surveys would also identify the requirement for additional mitigation based on the distribution of red squirrel at the time of construction.

9.5.363 A small magnitude of change is predicted and so the effects of disturbance are assessed as being minor adverse, although this would be reduced through additional mitigation (see section 9.6).

Notable mammals (brown hare, hedgehog and polecat)

9.5.364 Potentially significant effects on brown hare, hedgehog and polecat have been identified via the following pathways:

- mortality and injury of species;
- habitat loss and fragmentation; and
- disturbance (noise and lighting).

Mortality and injury

9.5.365 Mortality and injury of species within the Wylfa Newydd Development Area could occur where features with the potential to support nests, burrows or covers are removed, e.g. cloddiau, around existing and demolished buildings and long-grass habitats.

9.5.366 Good practice mitigation in the form of the provision of an ECoW and timing of works to avoid periods where there is the potential for dependent young to be present would therefore be applied (see section 9.4).

9.5.367 Fencing around the Wylfa Newydd Development Area would allow animals to escape via gaps left for Public Rights of Way and vehicular access.

9.5.368 With these measures in place, a negligible magnitude of change is predicted and so negligible effects would arise due to mortality and injury.

Habitat loss and fragmentation

9.5.369 The removal of all habitats within the Wylfa Newydd Development Area (excluding buffer zones) is considered likely to have the greatest effect on these notable mammal species. Habitat loss would result in the populations being displaced into adjacent areas of suitable habitat. Whilst suitable habitat is abundant in the wider area, it is considered that there could be some pressure on resource availability in the short-term. This could cause a small magnitude of change for brown hare and polecat owing to the mobility of these species.

9.5.370 The effects of displacing a population of hedgehogs are considered to constitute a greater effect due to the species' vulnerability to land use change and their loyalty to home ranges [RD77]. A displaced population is also potentially at greater risk of mortality and injury from traffic, as animals establish new home ranges and search for hibernation sites.

9.5.371 Fragmentation effects are possible due to the isolation of Wylfa Head and the plantation woodland habitats on Dame Sylvia Crowe's Mound from the wider environment because of habitat removal. This effect is not predicted for brown hare as there are no records of the species from these areas. For polecat, fragmentation effects would be negligible, as despite connecting habitats being removed, the effects would potentially only impact a very small number of animals.

9.5.372 The total area covered by Dame Sylvia Crowe's Mound and Wylfa Head is 26ha. Should hedgehog be present in this area at average densities of between 0.3 and two per hectare, there could be between eight and 13 hedgehogs present (appendix D9-15, Application Reference Number: 6.4.48). This is below the 120 individuals recommended by Moorehouse (2013) [RD78] as being the minimum value for a viable population in rural environments. Fragmentation effects could therefore cause temporary extinction of hedgehog from Dame Sylvia Crowe's Mound and Wylfa Head. This would be due to reduced access to food resources, as well as reduced recruitment into the area. The lack of recruitment could cause difficulties in finding mates and a reduction in gene flow, both of which have been shown to negatively affect the species [RD79]. Isolation of this habitat would therefore represent a large magnitude of change as the integrity of the habitat resource would be temporarily affected.

9.5.373 Habitat removal would be mitigated for in the medium to long-term by the provision of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), which would lead to the creation or reinstatement of enhanced new habitat that has connectivity to the wider landscape e.g. 20ha of woodland and 10km of hedgerow. Improved grassland, species-rich grassland and coastal heath/grass mosaic would be of value for foraging hedgehog due to the invertebrate assemblages likely to be supported by these

habitats. Woodland, stone-walls, and hedgerows would also benefit foraging or sheltering notable species.

9.5.374 Taken together, habitat loss, fragmentation and isolation on notable mammals would result in a small magnitude of change and so a negligible adverse effect is predicted.

Disturbance

9.5.375 Disturbance effects on notable mammals would only occur to retained habitats in the Wylfa Newydd Development Area and immediately adjacent areas.

9.5.376 Brown hare and polecat are highly mobile and may avoid habitats on the boundary of the Wylfa Newydd Development Area, but this effect would be lessened based on the abundance of similar habitat in the wider landscape. Hedgehog is less mobile but as a species that is regularly encountered in urban environments in close proximity to human activity, the species is considered to be reasonably tolerant of noise and lighting.

9.5.377 Good practice mitigation in the form of buffer zones would reduce the effects of noise and visual disturbance affecting retained habitats within the Wylfa Newydd Development Area that may be used by notable mammals e.g. Dame Sylvia Crowe's Mound, the Tre'r Gof SSSI, and riparian habitats. Good practice mitigation measures with respect to noise reductions would further reduce the effects of disturbance (see chapter D6, Application Reference Number: 6.4.6).

9.5.378 Temporary lighting may also affect the use of illuminated habitats by notable mammals during the night. This may reduce the effectiveness of retained habitats acting as buffer zones or dispersal routes throughout of the Wylfa Newydd Development Area.

9.5.379 The magnitude of change is predicted to be small and so the effects of disturbance would be minor. Additional mitigation with respect to disturbance from lighting is described in section 9.6.

Freshwater habitats

9.5.380 The main effects on freshwater habitats would occur as a result of bulk earthworks, topsoil clearance and watercourse realignment, installation of drainage, excavation of culverts and installation (and removal) of cofferdams around outfall sites. Potential pathways to significant effects are therefore considered to be:

- habitat loss and fragmentation;
- hydrological changes; and
- introduction and spread of INNS.

Habitat loss and fragmentation

9.5.381 Prior to topsoil clearance, site drainage would be installed including construction of sediment settlement ponds and associated outfalls into watercourses. A sediment settlement pond is proposed within the footprint of

the Nant Porth-y-pistyll (the Power Station Catchment). During creation of the pond, approximately 200m of low-quality riverine habitat would be lost.

9.5.382 During topsoil stripping and other earthworks activities, nine ponds would be permanently lost during Main Construction. The realignment of approximately 400m of Nant Caerdegog Isaf would also occur.

9.5.383 Vegetation clearance would involve the controlled displacement of species along approximately 300m of ephemeral ditch habitat running between Rhwng dau Fynydd and the Afon Cafnan.

9.5.384 There would be several discharge points for the surface water drainage that would discharge into freshwater habitats at the Afon Cafnan, the Nant Cemaes, the Nant Cemlyn, Tre'r Gof drains on the west side of the SSSI, and the Nant Caerdegog Isaf. Localised habitat loss under the footprint of the newly constructed outfalls, and changes to instream habitat, as a result of hydrological changes within the vicinity of the outfalls are predicted.

9.5.385 Good practice mitigation for the loss of habitat is included within the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) which has been developed to include new ponds as well as riparian planting around the proposed watercourse diversion.

9.5.386 Good practice mitigation also includes 15m buffer zones around specific retained watercourses (Nant Cemlyn, Afon Cafnan, Nant Caerdegog Isaf, Nant Cemaes, and drains into the Cae Gwyn SSSI and the Tre'r Gof SSSI). Where 15m is not practicable, a reduced buffer zone may be required or work completed using a site-specific risk assessment and method statement approach (e.g. during the realignment of the Nant Caerdegog Isaf or where drainage infrastructure would be installed into these watercourses).

9.5.387 With mitigation in place, Main Construction activities are predicted to result in a negligible magnitude of change and so effects of habitat loss and fragmentation would be negligible.

Hydrological changes

9.5.388 The main potential effects on freshwater habitats during Main Construction via hydrological changes would result from bulk earthworks, installation of drainage, topsoil clearance, the realignment of Nant Caerdegog Isaf, excavation of culverts, and installation (and removal) of cofferdams around outfall sites.

9.5.389 Modification of channels during the watercourse realignment may change the natural hydrology of the watercourse within the upstream and downstream tie-in points as well as the realigned channel. This has the potential to disrupt natural sedimentation processes, and natural transport and accretion of bed and bank material downstream.

9.5.390 Freshwater habitats may be affected by sediments mobilised during topsoil clearance. Sediment may enter nearby watercourses and be transported as fine sediments downstream, affecting the natural diversity and function of coarse substrates, and reducing habitat suitability for other aquatic receptors. An increase in sedimentation can influence stream processes and thereby instream freshwater habitat. All sediment releases, including those associated

with runoff would be mitigated through embedded mitigation including an appropriate drainage design, incorporating a system of sediment settlement ponds and treatment with polyelectrolytes.

9.5.391 Changes to the volume of water discharged into the watercourses are possible. Changes to fluvial geomorphology and surface water conditions are discussed in chapter D8 (Application Reference Number: 6.4.8). The watercourse diversion would result in a channel with increased sinuosity leading to a greater diversity of flow conditions with subsequent improvement in habitat quality.

9.5.392 The Main Power Station Site sub-CoCP (Application Reference Number: 8.7) includes good practice mitigation in the form of buffer zones (Ecology and Landscape Management Strategy), and adherence to good practice mitigation measures with respect to pollution prevention (Surface Water and Groundwater Management Strategy) and dust suppression (Air Quality Management Strategy). See also section 9.5 and chapters D5 and D8 (Application Reference Numbers 6.4.5 and 6.4.8).

9.5.393 Based on the implementation of good practice mitigation, construction is predicted to result in negligible magnitude of hydrological change and therefore a negligible effect on freshwater habitats.

Introduction and spread of INNS

9.5.394 There is also the potential for the introduction and spread of INNS into freshwater habitats. The potential for the introduction and spread of INNS would be reduced by the good practice mitigation measures included in the Biosecurity Risk Assessment and Method Statement (contained in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)), and effects are assessed to be of negligible magnitude and therefore negligible effect.

Macroinvertebrates

9.5.395 The main potential effects on macroinvertebrates during Main Construction works would result from activities including bulk earthworks, the realignment of the Nant Caerdegog Isaf, installation of drainage, excavation of culverts, and installation (and removal) of cofferdams around outfall sites. Potential pathways for significant effects to macroinvertebrate species are considered to be:

- mortality and injury of species;
- habitat loss or fragmentation; and
- hydrological changes.

Mortality and injury

9.5.396 During the watercourse diversion, sessile macroinvertebrates within the original channel of the watercourse diversion would be lost, though communities are expected to quickly re-colonise the realigned channel through downstream drift following the diversion. No taxa of high conservation value were identified near the watercourse realignment site. The potential for

an effect on general macroinvertebrate populations is low, with a negligible magnitude of change predicted and therefore a negligible effect.

9.5.397 The loss of nine ponds, including two that meet Priority pond status (Tregele Pond and Power Station Pond), would occur during the installation of drainage, topsoil clearance and vegetation removal. Without additional mitigation (see section 9.6), macroinvertebrates of conservation interest (minute moss beetle and mud snail) within these water features would be lost and so there is the potential for a large magnitude of change resulting in a moderate effect through mortality.

Habitat loss or fragmentation

9.5.398 Good practice mitigation for the loss of habitat would be included as part of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and would involve both pond habitat creation, and habitat enhancement, such as the establishment of buffer zones and riparian planting.

9.5.399 As such, a small magnitude of change and minor adverse effect are predicted.

Hydrological changes

9.5.400 During vegetation and topsoil clearance, there would be the potential for the release of pollutants into watercourses as a result of site runoff and accidental spills. Sedimentation may smother habitats and individuals. Increased sediment loading may also result in reduced primary production rates of algae and macrophyte species due to decreased light penetration.

9.5.401 The potential effects of fine silt on retained water bodies are discussed in chapter D8 (Application Reference Number: 6.4.8). All sediment releases, including those associated with runoff, would be mitigated through embedded and good practice mitigation including buffer zones, adherence to PPGs and a drainage design incorporating a system of sediment settlement ponds and polyelectrolyte treatment (see chapter D8 Application Reference Number: 6.4.8 and section 9.4 of this document). Changes to water quality conditions at the sediment settlement ponds discharge points may result in localised changes to the macroinvertebrate community structures within the vicinity of the outfall.

9.5.402 The inclusion of embedded and good practice mitigation is likely to result in a negligible magnitude of change and therefore effects of hydrological change would be negligible.

Freshwater fish

9.5.403 The effects on freshwater fish during Main Construction would result from bulk earthworks, topsoil clearance, the realignment of Nant Caerdegog Isaf, installation of drainage, excavation of culverts and installation (and removal) of cofferdams around outfall sites. Potentially significant effects on freshwater fish within the Wylfa Newydd Development Area have been identified via the following pathways:

- mortality and injury of species;
- habitat loss or habitat fragmentation;

- hydrological changes; and
- disturbance.

Mortality and injury

9.5.404 Approximately 200m of riverine habitat supporting a small population of European eel would be lost from Nant Porth-y-pistyll, adjacent to the Existing Power Station. The upper reach of the watercourse is culverted with the lower 200m of open channel flowing into Porth-y-pistyll. During the watercourse realignment, fish may be at risk from mortality and injury associated with dewatering.

9.5.405 Good practice mitigation, in the form of fish rescues, reduces the potential for fish mortality within the watercourse to a negligible magnitude of change and therefore a negligible effect.

Habitat loss or fragmentation

9.5.406 Habitat fragmentation would result from hydrological changes (see below) reducing connectivity between habitats or an increase in instream barriers, for example culverts.

9.5.407 Good practice mitigation in the form of buffer zones and the avoidance of works within known migratory periods would ensure that the effects of habitat loss and fragmentation are reduced.

9.5.408 However, the installation of outfalls and changes in flow conditions as a result of site drainage (refer to chapter D8, Application Reference Number: 6.4.8) may result in small magnitude changes and so minor adverse effects are predicted.

Hydrological changes

9.5.409 Accidental release of pollutants through spills or leaks may include but is not limited to, fuel and oil from plant and fine sediment release. The organic constituents of runoff may include vehicle fuel and oil, other hydrocarbons, herbicides and pesticides, all of which cause deleterious effects to fish. Immiscible fuel and oil present a direct threat of mortality to fish by coating gill structures. Suspended solids from an increase in sedimentation could prevent the successful development of fish eggs and larvae, and affect respiration through the clogging of gills and the smothering of food sources.

9.5.410 Hydrological changes could also result in habitat loss or fragmentation affecting sensitive receptors.

9.5.411 Potential changes in water quality would be controlled through embedded and good practice mitigation, such as the development of the drainage design and adherence to PPGs.

9.5.412 The potential magnitude of hydrological change is predicted to be negligible, therefore the predicted effect will be negligible.

Disturbance

9.5.413 Noise (vibration) emissions have the potential to create a deterrent to fish species, preventing or delaying their migration through a watercourse. Topsoil clearance, vehicle movements, open cutting and excavation activities carried out in the vicinity of a watercourse could generate ground-borne vibrations that might propagate into watercourses. Depending on the frequency and levels of noise, this may have the potential to affect sensitive species (including brown trout and European eel) and at various life stages.

9.5.414 Good practice mitigation includes buffer zones along the specific retained watercourses (as detailed in section 9.4 and chapter D8, Application Reference Number: 6.4.8). Where 15m is not practicable, a reduced buffer zone may be required, or works would be completed under a risk assessment and method statement approach (e.g. where drainage infrastructure is connected to retained watercourses or during the realignment of the Nant Caerdegog Isaf). Disturbance to freshwater fish through noise and vibrations would therefore be limited to localised temporary effects during the watercourse realignment and creation of outfall locations.

9.5.415 The potential magnitude of disturbance is considered to be negligible, leading to a negligible effect.

Operation

Pathways to effects

9.5.416 Terrestrial and freshwater ecology receptors across the Wylfa Newydd Development Area may potentially be affected during operational activities via a number of pathways as outlined below. During the operational period, construction of the spent fuel storage buildings would also take place which could potentially lead to effects upon terrestrial ecology receptors via disturbance pathways and air quality changes.

Mortality and injury of species

9.5.417 Operation of the Cooling Water System may result in entrainment and or impingement of fish receptors that move between the freshwater and marine environments as part of their life-cycle. This would include migratory species that may utilise freshwater habitats, including European eel, brown trout and lamprey species. Potential effects are discussed in chapter D13 (Application Reference Number: 6.4.13).

Habitat loss/gain, fragmentation or modification/degradation

9.5.418 During operation, it is not considered likely that there would be any habitat loss, fragmentation or degradation that could affect terrestrial habitats other than those described below in the hydrological changes section.

Species disturbance (including noise, vibration, visual and light disturbance)

9.5.419 The potential disturbance effects from operation would affect a similar range of receptors as those detailed in the construction effects sections on

disturbance, with effects identified that could principally affect mobile receptors. The provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would become fully established during the operational period, with those species recolonising newly established habitats and becoming habituated to disturbance effects from the operation of the Power Station.

9.5.420 During the construction of the spent fuel storage buildings, there is the potential for qualifying features of designated sites and/or mobile species to be affected by noise, vibration, lighting or visual disturbance in the areas around the construction works to the south-west of the Power Station.

Air quality changes

9.5.421 Changes to air quality during operational activities would be principally associated with the on-site use of combustion plant and machinery and could potentially have an effect on designated sites, terrestrial habitats, freshwater habitats, fungi and lichen. A summary of the possible effects is detailed in chapter D5 (Application Reference Number: 6.4.5).

Hydrological changes (including water quality and quantity)

9.5.422 Hydrological changes are detailed in chapter D8 (Application Reference Number: 6.4.8) and include changes to both water quality and quantity within watercourses and wetland areas.

9.5.423 There is the potential for changes in water quality from accidental spills on site and an increase in road runoff leading to elevated contaminant loads entering watercourses. Contaminants discharged into watercourses can have adverse effects on aquatic and riparian organisms through toxicity and bioaccumulation.

9.5.424 Modification of hydrological regimes could result in changes to wetland habitats, notably within the Tre'r Gof SSSI and the Cae Gwyn SSSI.

9.5.425 Changes to the quantity of flow could potentially alter in-stream habitat within a channel making it less suitable for certain receptors.

Receptor-based assessment

9.5.426 During the operation of the Power Station there are a number of terrestrial receptors for which no potentially significant effects are anticipated. These receptors are not sensitive to the predicted levels of changes in air quality (see chapter D5, Application Reference Number: 6.4.5) or hydrological changes (see chapter D8, Application Reference Number: 6.4.8) that may occur during operation and are unlikely to suffer disturbance during either the ongoing operation of the Power Station or as a result of construction of the spent fuel storage buildings. No pathways to significant effects are predicted for the following receptors:

- ancient woodland (retained woodland at Manor Gardens);
- terrestrial habitats (excluding specified designated sites);
- lichen;

- terrestrial invertebrates;
- GCN;
- common toad;
- adder and common lizard;
- red squirrel;
- notable mammals (brown hare, hedgehog and polecat); and
- macroinvertebrates.

9.5.427 Those receptors where pathways to significant effects during operation have been identified are discussed individually below.

Tre'r Gof SSSI

9.5.428 Potentially significant effects on the Tre'r Gof SSSI as a result of operation of the Power Station have been identified via the following pathways:

- air quality changes; and
- hydrological changes.

Air quality changes

9.5.429 Chapter D5 (Application Reference Number: 6.4.5) predicted long-term nitrogen deposition rates at the Tre'r Gof SSSI to increase by 0.8%, the site already experiencing deposition rates above the critical load for this habitat. Using Caporn *et al.* 2016 study [RD50], it is considered that the predicted increase in nitrogen deposition at Tre'r Gof SSSI would potentially result in a less than 1% decrease in total species richness within the site, with a similarly small increase in the coverage of competitive grass and sedge species, and an associated reduction in the less competitive forb species present. Such small predicted changes in species compositon are considered to present a negligible effect on the site.

9.5.430 The potential effects from commissioning testing of the plant associated with the Power Station identified 24-hour mean NO_x levels potentially exceeding critical levels of 75µg/m^3 at the Tre'r Gof SSSI, although the probability of this occurring was 15% (Chapter D5, Application Reference Number: 6.4.5). The frequency of these events occurring is two 24-hour periods within the 60-year lifespan of the Power Station.

9.5.431 The study of Morgan *et al*. [RD52] exposed bryophytes to constant 24-hour concentrations of 65µg/m^3 of NO_x over three weeks, which resulted in the damaging effects they described. It was also observed that the physiological damage which had occurred over this period of constant exposure was reversed following exposure to a similar period of pollution-free (i.e. 0µg/m^3) conditions. However, it is acknowledged that the study did not investigate the effects of exposure to higher concentrations of NO_x, in particular those at the levels predicted at the Tre'r Gof SSSI, and these sites already experience background concentrations of NO_x, albeit relatively low concentrations which are well below the critical level. However, the study does show that physiological change as a result of NO_x exposure can reverse once levels decline, demonstrating that any effects that were felt as a result of the 24-hour

concentration levels are unlikely to be permanent, especially when the short-term nature of the exposure is considered.

9.5.432 Given the infrequency of commissioning testing, the brief (24-hour) period during which the highest levels of NO_x could be experienced, and the relatively low probability of exceedance at the Tre'r Gof SSSI, it is considered unlikely that bryophyte assemblages at this site would experience long-term negative effects as a result of NO_x emissions during commissioning testing. As background concentrations at the Tre'r Gof SSSI are well below the critical level, if there were negative effects then bryophytes would be expected to recover between commissioning tests.

9.5.433 Chapter D5 (Application Reference Number: 6.4.5) assesses the potential short-term effects for the use of the standby generators in an emergency situation (referred to as loss of off-site power (LOOP) and loss of coolant accident (LOCA) scenarios). This would require all emergency and back-up generators to operate for at least a period of two hours after which some may shut down. The occurrence of a LOOP or LOCA event which would extend to 24 hours is predicted to be a one in 200-year event, and as such it is not considered further in this assessment.

9.5.434 Chapter D5 (Application Reference Number: 6.4.5), also considers the Mobile Emergency Equipment Garage (MEEG) mobile plant testing scenario, which indicates that there would potentially be exceedances of the 24 hour mean critical level for NOx at Tre'r Gof SSSI. However, the MEEG testing scenario has been modelled conservatively and the predicted concentrations would be considerably lower than presented in chapter D5 (Application Reference Number: 6.4.5). The modelling assumes that the largest plant item (14.5MWth) runs continuously, whereas in reality the thermal inputs of the sources being testing vary between 0.5MWth to 14.5MWth. There are also approximately 45 individual plant items associated with the MEEG testing, and it is anticipated that maintenance testing of the plant would take place once a month with each item of plant being tested for approximately five minutes. The MEEG testing and associated emissions of pollutants to air would therefore have a duration of approximately 3.75 hours in any 24-hour period.

9.5.435 The MEEG testing scenario has been modelled with testing occurring continuously throughout the year (i.e. 24 hours per day, 365/366 days per year) using 10 years of meteorological data where the highest concentration of any 24-hour period was selected. As the MEEG testing would only occur for 3.75 hours in any day, the maximum 24-hour mean concentrations predicted would be considerably less (i.e. approximately 84% lower) than those presented in chapter D5 (Application Reference Number: 6.4.5). Given the conservative modelling approach, exceedances of the 24-hour mean critical level for NOx are not likely to occur, and it is therefore not considered further in this assessment.

9.5.436 Based on the above assessments, it is predicted that the long-term changes in air quality would lead to a very minor loss of, or detrimental alteration to the site's interest features, representing a negligible magnitude of change and a negligible adverse effect.

Hydrological changes

9.5.437 The hydrological assessment in chapter D8 (Application Reference Number: 6.4.8) has assessed the effects of changes to water quantity and quality to the Tre'r Gof SSSI during the operational period. Based on the conclusions of chapter D8 (Application Reference Number: 6.4.8), the activities or changes that would potentially result in a minor magnitude of change or greater are discussed in this section.

9.5.438 The assessment has identified that a medium magnitude of change would arise due to a reduction in water availability caused by a reduction in the catchment area owing to the presence of landscape mounding and drainage. This in turn could affect water quality within the SSSI. The effects of changes to water quantity and quality during operation would be consistent with those for construction, as described in section 9.5, and a similar level of uncertainty around the mitigation design would still exist.

9.5.439 As such, taking a precautionary approach, it is not possible to confidently predict a magnitude of change less than large over the long-term, which would result in a major adverse effect.

Cae Gwyn SSSI

9.5.440 Potentially significant effects on the Cae Gwyn SSSI as a result of operation of the Power Station have been identified via the following pathways:

- air quality changes; and
- hydrological changes.

Air quality changes

9.5.441 The air quality assessment in chapter D5 (Application Reference Number: 6.4.5) shows that the Cae Gwyn SSSI would not be subject to an exceedance in critical loads or critical levels above the threshold at which significant effects could arise.

9.5.442 The potential effects from commissioning testing of the plant associated with the Power Station identified 24-hour mean NO_x levels potentially exceeding critical levels of 75µg/m^3 at the Cae Gwyn SSSI although the probability of this occurring was 1% (Chapter D5, Application Reference Number: 6.4.5). The frequency of these events occurring is two 24-hour periods within the 60-year lifespan of the Power Station.

9.5.443 Given the infrequency of commissioning testing, the brief (24-hour) period during which the highest levels of NO_x could be experienced, and the relatively low probability of exceedance the Cae Gwyn SSSI, it is considered unlikely that bryophyte assemblages at this site would experience long-term negative effects as a result of NO_x emissions during commissioning testing. As background concentrations at Cae Gwyn SSSI are well below the critical level, if there were negative effects then bryophytes would be expected to recover between commissioning tests.

9.5.444 Based on the above, a negligible magnitude of change leading to negligible effects is predicted.

Hydrological changes

9.5.445 The hydrological assessment in chapter D8 (Application Reference Number: 6.4.8) has assessed the effects of changes to water quantity and quality to the Cae Gwyn SSSI during the operational period. Taking into account the embedded and good practice mitigation measures that would be implemented to protect the SSSI, the assessment in chapter D8 (Application Reference Number: 6.4.8) considers that the magnitude of change would be negligible. As such, effects to the SSSI would also be negligible.

Cemlyn Bay SSSI and Bae Cemlyn/Cemlyn Bay SAC

9.5.446 Potentially significant effects on the Cemlyn Bay SSSI/SAC as a result of operation of the Power Station have been identified via the following pathways:

- air quality changes; and
- changes to coastal processes.

Air quality changes

9.5.447 The air quality assessment in chapter D5 (Application Reference Number: 6.4.5) shows that the Cemlyn Bay SSSI/SAC would not be subject to an exceedance in critical loads or critical levels above the threshold at which significant effects could arise. As such, this site is not considered further.

Changes to coastal processes

9.5.448 The coastal processes and geomorphology assessment in chapter D12 (Application Reference Number: 6.4.12) considers the operational effects to the shingle ridge at the Cemlyn Bay SSSI/SAC.

9.5.449 Chapter D12 (Application Reference Number: 6.4.12) considers that small magnitude changes to the shingle ridge may arise but only in the context of increased wave height during a worst case scenario winter storm. The assessment in chapter D12 (Application Reference Number: 6.4.12) also considers that any changes to wave height would be within the range of natural changes predicted due to climate change, and that these changes would be experienced with or without the Power Station.

9.5.450 A small magnitude of change would typically result in minor adverse effects. However, in this instance the likelihood of the predicted change occurring due to operation of the Power Station is sufficiently remote that a conclusion of negligible effects is considered to be appropriate. This conclusion is consistent with the findings of the Shadow HRA Report (Application Reference Number: 5.2).

9.5.451 However, to reflect the uncertainty, geomorphological monitoring is proposed during operation to identify any changes to baseline conditions that could be attributed to the Power Station (see chapter D12. Application Reference Number: 6.4.12).

Statutory and non-statutory designated sites potentially affected by changes to air quality

9.5.452 Several designated sites are located within the air quality study area (15km) associated with operation of the Power Station (see chapter D5, Application Reference Number: 6.4.5). However, the air quality assessment in chapter D5 (Application Reference Number: 6.4.5) shows that no other designated sites would be subject to an exceedance in critical loads or critical levels above the threshold at which significant effects could arise during the operational scenario modelled.

9.5.453 The potential effects from commissioning testing of the plant associated with the Power Station identified 24-hour mean NO_x levels potentially exceeding critical levels of 75µg/m^3 at the Trywn Pencarreg Wildlife Site, although the probability of this occurring was less than 1% (Chapter D5, Application Reference Number: 6.4.5). The frequency of these events occurring is two 24-hour periods within the 60-year lifespan of the Power Station. Given the very low probability, it is not considered that there would be adverse effects to Trwyn Pencarreg Wildlife Site as a result of commissioning testing.

Fungi

9.5.454 As the air quality assessment in chapter D5 (Application Reference Number: 6.4.5) shows, the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site would not be subject to an exceedance in critical loads or critical levels above the threshold at which significant effects could arise. As such, it is concluded that there would be no significant effects to fungi from operational air quality changes.

Chough

9.5.455 Potentially significant effects on chough have been identified via the following pathway:

- disturbance.

9.5.456 In respect of the operation of the Power Station, tolerance of chough to noise and visual disturbance is predicted to be high, based on chough nesting in a building within the Existing Power Station and having adapted to noise associated with its operation.

9.5.457 The results of noise modelling show that noise levels under normal operational conditions would be consistent with the baseline conditions. Noise levels of less than 35dB $L_{Aeq,T}$ are predicted at the historic chough nesting sites and within areas of core foraging habitat (see appendix D9-14, Application Reference Number: 6.4.47) during normal operational conditions. During very rare worst case scenarios when all emergency equipment would be in operation, noise levels at Wylfa Head and within core foraging habitat are temporarily predicted to be between 35dB $L_{Aeq,T}$ and 45dB $L_{Aeq,T}$. Foraging areas on coastal grassland at Trwyn Pencarreg Wildlife Site are predicted to experience temporary worst case noise levels of 50dB $L_{Aeq,T}$ during very rare events. These noise levels would represent a negligible magnitude of change and would result in negligible effects on chough.

9.5.458 Construction of the spent fuel storage buildings is scheduled to commence in year 15 and would take two years to complete. This facility would be located in the south-west corner of the Power Station Site. The closest current chough breeding site is 1.2km away in the Existing Power Station. The current Wylfa Head breeding site is 1.7km away. Given these distances, disturbance to chough at their nest sites or within core foraging habitat would therefore not arise as a result of construction activity.

9.5.459 The spent fuel storage buildings would be screened from possible foraging habitats outwith the Wylfa Newydd Development Area by landscape mounds C, D and E, and so visual and noise disturbance is unlikely to affect non-breeding foraging chough. Good practice mitigation with respect to noise reduction measures would also be implemented during construction.

9.5.460 The magnitude of change to chough due to construction noise is predicted to be negligible. The effects of disturbance are predicted to be negligible.

Breeding birds

9.5.461 Potentially significant effects on breeding birds have been identified via the following pathways:

- disturbance.

9.5.462 An assessment of the noise levels generated during operational conditions is provided in chapter D6 (Application Reference Number: 6.4.6). The results of the noise modelling assessment show that the magnitude of change as a result of normal operational disturbance would be negligible, with the majority of restored or newly created habitats within the Wylfa Newydd Development Area not subject to noise disturbance significantly above baseline levels. Only localised areas immediately adjacent to new Power Station buildings would experience noise levels above 55dB.

9.5.463 Breeding barn owl roosts at Cafnan Farm and Caerdegog Isaf would experience normal operational noise levels of less than 35dB $L_{Aeq,1\text{-}hour}$. During very rare worst case scenarios when all emergency equipment would be in operation, noise levels at these roosts are temporarily predicted to be between 40dB $L_{Aeq,T}$ and 45dB $L_{Aeq,T}$.

9.5.464 These predicted noise levels under normal and worst case conditions would represent a negligible magnitude of change and would result in negligible effects on breeding birds.

9.5.465 Temporary noise disturbance during the construction of the spent fuel storage buildings could adversely affect the survival, range and abundance of certain bird species. Given the availability of suitable habitats beyond the Wylfa Newydd Development Area, disturbance is unlikely to affect birds using habitats close to the location of the spent fuel storage buildings for foraging alone and significant effects are only likely for those species which are breeding in close proximity to the location of the proposed construction works.

9.5.466 Disturbance could also affect barn owls which breed at Cafnan Farm and Caerdegog Isaf. However, both are located further than 100m from the location of the spent fuel storage buildings and would be screened by Mounds D and C, respectively. Breeding barn owls have also demonstrated tolerance

to noise disturbance with owls successfully breeding at Caerdegog Isaf in 2017 despite (third party) works involving the replacement of a building's roof at the site (pers. comm. with Horizon Environmental Coordinators). Any noise disturbance as a result of construction of the spent fuel storage buildings is unlikely to affect the breeding success of this species.

9.5.467 Given the temporary and limited nature of the construction works in respect of the spent fuel storage buildings and the availability of alternative bird breeding and foraging habitats in the wider area, the magnitude of change is predicted to be negligible. The effects on breeding birds are therefore considered to be negligible.

Over-wintering and passage birds

9.5.468 As discussed above, changes associated with operational noise disturbance are expected to be negligible with effects to over-wintering and passage birds also expected to be negligible.

9.5.469 It is assessed that disturbance effects during construction of the spent fuel storage buildings would also be negligible, based on embedded mitigation (landscape mounds) and good practice mitigation (noise reduction measures during construction). The localised and temporary nature of the works would further reduce the magnitude of change.

9.5.470 The effects on over-wintering and passage birds are therefore considered likely to be negligible.

Bats

9.5.471 Potentially significant effects on bats have been identified via the following pathway:

- disturbance.

9.5.472 The results of noise modelling show that the magnitude of change under normal operational conditions would be negligible (chapter D6, Application Reference Number: 6.4.6). The majority of restored or newly created habitats within the Wylfa Newydd Development Area would not be subject to noise disturbance significantly above baseline levels. Under normal conditions, operational noise levels at Tyn-y-Maes bat barn and the new bat barns to the east of the A5025 and the west of Cemaes would be less than 35dB $L_{Aeq,T}$. During very rare worst case scenarios when all emergency equipment would be in operation, noise levels at Tyn-y-Maes bat barn are temporarily predicted to be between 35dB $L_{Aeq,T}$ and 45dB $L_{Aeq,T}$; noise levels during these periods may increase to 55dB $L_{Aeq,T}$ in some localised foraging areas at Dame Sylvia Crowe's Mound. These predicted noise levels under normal and worst case operational conditions would represent a negligible magnitude of change and would result in negligible effects on roosting and foraging bats.

9.5.473 There is potential for operational lighting to disturb roosting, commuting or foraging bats. Embedded mitigation in the form of lighting designed in accordance with the Wylfa Newydd CoOP (Application Reference Number: 8.13) would seek to avoid the illumination of retained or newly

created linear habitats (e.g. hedgerows, walls, woodland edges, treelines) and other high quality foraging areas.

9.5.474 The Tyn-y-Maes bat barn and newly created roosts created as part of the EPSML obtained for construction of the Power Station would remain unlit. Furthermore, due to the heavily wooded area directly between the bat barn and both the Existing Power Station and the Wylfa Newydd Power Station, there would be no lighting visible (see appendix D10-10 Environmental Lighting Impact Assessment, Application Reference Number: 6.4.67).

9.5.475 The Tyn-y-Maes bat barn and the location of the new bat barn that would be delivered as part of the EPSML are located in excess of 1km from the proposed location of the spent fuel storage buildings. Given the distances involved, noise or visual disturbance from construction are not predicted.

9.5.476 The magnitude of change to bats due to operational disturbance is predicted to be negligible. The effects of disturbance are predicted to be negligible.

Otter

9.5.477 Potentially significant effects on otter have been identified via the following pathway:

- hydrological changes during operation and construction of the spent fuel storage buildings.

9.5.478 Otter could be affected, either directly or indirectly, by hydrological changes (as detailed in chapter D8, Application Reference Number: 6.4.8) affecting water quality and quantity within nearby watercourses and wetland areas.

9.5.479 Drainage mitigation during operation would be embedded in the detailed design. An Environmental Emergency Preparedness and Response Procedure would be implemented as part of the Wylfa Newydd CoOP (Application Reference Number: 8.13) which would detail the arrangements and procedures for managing any environmental incidents.

9.5.480 Good practice mitigation would be followed during construction of the spent fuel storage buildings. These measures are anticipated to be consistent with those implemented during Main Construction and so would be adequate to protect watercourses and other habitats of value for otter.

9.5.481 It is considered that this embedded and good practice mitigation would reduce the magnitude of change to negligible and so negligible effects on otter are expected during operation.

Water vole

9.5.482 The assessment for water vole during the operational phase is as for otter, detailed above.

9.5.483 Based on the proposed good practice and embedded mitigation, the magnitude of change would be negligible and so negligible effects on water vole are expected during operation.

Freshwater fish

9.5.484 Potentially significant effects on freshwater fish from operation have been identified via the following pathways:

- mortality and injury of species; and
- hydrological changes during operation and construction of the spent fuel storage buildings.

Mortality and injury

9.5.485 Accidental release of pollutants through spills or leaks may include but is not limited to fuel and oil from plant and fine sediment release. The organic constituents of runoff may include vehicle fuel and oil, other hydrocarbons, herbicides and pesticides, all of which cause deleterious effects to fish. Immiscible fuel and oil may present a direct threat of mortality to fish by coating gill structures.

9.5.486 Potential changes in water quality would be largely controlled through embedded mitigation such as the development of the drainage design, incorporating a system of sediment settlement ponds and oil interceptors. The provisions of the Surface Water and Groundwater Management Strategy and the Environmental Emergency Management Strategy, both contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), would provide mitigation for potential effects on the water environment.

9.5.487 A negligible magnitude of change is predicted and so the effects of mortality and injury would be negligible.

Hydrological changes

9.5.488 Hydrological changes from increased surface water run off may modify natural river process and affect habitat availability to fish species. Changes in flow conditions as a result of site drainage (refer to chapter D8, Application Reference Number: 6.4.8) may result in minor adverse effects caused by habitat loss/fragmentation.

9.5.489 With the inclusion of embedded and good practice mitigation, (as detailed in chapter D8, Application Reference Number: 6.4.8), the magnitude of change is considered to be negligible and effects of hydrological change would be negligible.

Decommissioning

9.5.490 The operational lifetime of the Power Station would be 60 years. During this time, habitat created through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would develop and the ecological baseline of the Wylfa Newydd Development Area would evolve in response to a variety of environmental factors. The effects of decommissioning are therefore uncertain given that the baseline at that time would not necessarily reflect what it is today. The methods of decommissioning, including technologies used, are also uncertain at this time. The environmental changes caused during decommissioning are however

likely to be similar to those identified in the Main Construction assessment. The anticipated pathways to effects are discussed below.

Pathways to effects

Mortality and injury of species

9.5.491 Effects as a result of mortality and injury are likely to be limited given decommissioning would not involve large scale loss of habitats. The potential for direct mortality is likely to be limited to breeding birds using the Power Station buildings and structures for nesting. Such effects could be addressed via standard approaches such as timing of works and ecological supervision, as described for Main Construction.

Habitat loss/gain, fragmentation or modification/degradation

9.5.492 Habitat loss and fragmentation would not occur as decommissioning would involve the demolition of Power Station infrastructure. However, degradation of habitats could occur as a result of changes in air quality and hydrology, including water quality and quantity during demolition works. These impacts and the resulting effects would likely be temporary for the duration of the demolition works and many are likely to be mitigated to non-significant levels through the implementation of well-established good practice measures similar to those that would be adopted during Main Construction.

Species disturbance (including noise, vibration, visual and light disturbance)

9.5.493 Disturbance to sensitive receptors could arise during decommissioning. However, the effects would be partially mitigated by the landscape mounds and associated planting. These features would provide some screening from areas outwith the Wylfa Newydd Development Area. Good practice guidelines consistent with those implemented during Main Construction would also be adopted.

Receptor-based assessment

9.5.494 Potentially significant effects on ecological receptors, identified as valuable in the current baseline, are considered possible for those receptors sensitive to habitat loss, changes in air quality, hydrological changes, and disturbance (via noise, vibration and lighting). These would include:

- Cemlyn Bay SSSI/SAC;
- Tre'r Gof SSSI;
- Cae Gwyn SSSI;
- Trwyn Pencarreg Wildlife Site;
- Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site;
- terrestrial habitats;
- fungi;
- lichen;

- adder and common lizard;
- chough;
- breeding birds;
- over-wintering and passage birds;
- bats;
- otter;
- water vole;
- red squirrel;
- freshwater habitats;
- macroinvertebrates; and
- freshwater fish.

9.5.495 The works required to decommission the Power Station would be subject to a separate EIA which would assess in detail the effects against the baseline conditions at that time.

Transboundary

9.5.496 Following consultation, a recommendation was made in the scoping opinion that "…*consideration should be given in the ES to any likely significant effects on the environment of another Member State of the European Economic Area. In particular, the [IPC] recommends consideration should be given to discharges to the air and sea and to potential impacts on migratory species.*" (see chapter B9, Application Reference Number: 6.2.9).

9.5.497 With respect to terrestrial and freshwater ecology, the pathway for transboundary effects would be through effects to the following receptors:

- breeding and over-wintering bird species; and,
- European eel, river lamprey and brown trout.

9.5.498 Effects on seabirds may also lead to transboundary effects. These are addressed within chapter D13 (Application Reference Number: 6.4.13).

9.5.499 Although both the breeding and over-wintering bird assemblages within the study area have been assigned a value of low, within each assemblage are migratory species and species which form qualifying features of European Designated Sites. Both breeding and over-wintering birds would experience some habitat loss and temporary disturbance during construction, although this is considered to be small in magnitude. Extensive suitable alternative habitat exists immediately surrounding the Wylfa Newydd Development Area and the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) would recreate habitats of value to both breeding and over wintering birds. Disturbance effects would be temporary during construction only and, given the value of the receptor, the effects are considered to be minor adverse. No significant effects from the Wylfa Newydd Project on breeding and over-wintering bird species have been identified and thus it is unlikely that significant transboundary effects would occur. This

conclusion is consistent with the findings of the Shadow HRA Report (Application Reference Number: 5.2).

9.5.500 European eel, river lamprey and sea trout are migratory fish species which move between freshwater and the marine environment during their life cycle. European eel has been recorded in all the main catchments within the desk and field study area. River lamprey and sea trout have been recorded during the marine surveys described in chapter D13 (Application Reference Number: 6.4.13), but not within freshwater watercourses within the Wylfa Newydd Development Area. Given that the potential transboundary effects for these species would occur during their marine migration, this is covered further in chapter D13 (Application Reference Number: 6.4.13).

9.6 Additional mitigation

9.6.1 In accordance with chapter B1 (Application Reference Number: 6.2.1), embedded and good practice mitigation measures relevant to terrestrial and freshwater ecology were taken into account when determining the 'pre-mitigation' significance of effects. These are detailed in the design basis and activities section of this chapter.

9.6.2 Additional mitigation measures would be implemented to address potential significant effects identified in the assessment of effects section. These additional mitigation measures are summarised in tables D9-10, D9-11 and D9-12 for construction, operation and decommissioning, respectively. Additional mitigation would be secured as DCO requirements or through the Wylfa Newydd CoCP (Application Reference Number: 8.6), Main Power Station Site sub-CoCP (Application Reference Number: 8.7), Wylfa Newydd CoOP (Application Reference Number: 8.13) or the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.6.3 All identified adverse effects that are minor or above are presented in table D9-9, including whether additional mitigation is practicable to reduce the significance of effects. The details of all additional measures are then provided. An assessment of the residual effects following implementation of additional mitigation is provided in section 9.7.

Table D9-9 Adverse effects summary

Receptor	Effect	Significance	Additional mitigation possible
Tre'r Gof SSSI	Air quality	Moderate adverse	Yes
	Hydrological changes	Major adverse	Yes
Cemlyn Bay SSSI/SAC	Air quality	Minor adverse	Yes
Cae Gwyn SSSI	Air quality	Minor adverse	Yes
	Hydrological changes	Minor adverse	Yes

Receptor	Effect	Significance	Additional mitigation possible
Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site	Air quality	Moderate adverse	Yes
	Habitat loss, fragmentation or modification	Moderate adverse	Yes
Ancient woodland	Habitat loss (ID 26059 and ID 26075)	Major adverse	Yes
Terrestrial habitats	Habitat loss, fragmentation or modification	Minor adverse	Yes
Fungi	Habitat loss, fragmentation or modification	Moderate adverse	Yes
Lichen	Air quality	Minor adverse	Yes
Terrestrial invertebrates	Mortality and injury	Minor adverse	Yes
	Disturbance	Minor adverse	Yes
Chough	Habitat loss, fragmentation or modification	Moderate adverse	Yes
	Disturbance	Moderate adverse	Yes
Breeding birds	Disturbance	Minor adverse	Yes
Over-wintering and passage birds	Disturbance	Minor adverse	No
Bats	Disturbance	Minor adverse	Yes
Red squirrel	Disturbance	Minor adverse	Yes
Notable mammals	Disturbance	Minor adverse	Yes
Macroinvertebrates	Mortality and injury	Minor adverse	Yes
Freshwater fish	Habitat loss, fragmentation or modification	Minor adverse	No

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Construction

Table D9-10 Additional mitigation measures - construction

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Pre-construction monitoring data would be used during detailed design to refine the drainage system to reduce potential effects on watercourse catchments in the Wylfa Newydd Development Area. Monitoring during Main Construction would enable adaptive management of the drainage system to mitigate any movement away from baseline conditions. This mitigation would be delivered through the Surface Water and Groundwater Management Strategy within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	Reduce sediment loading to sensitive surface water features (i.e. the Tre'r Gof SSSI and the Cae Gwyn SSSI) and prevent deterioration of surface waters (chapter D8, Application Reference Number: 6.4.8).	Sampling of discharge water to check concentrations post-treatment do not significantly exceed baseline water quality levels (chapter D8, Application Reference Number: 6.4.8).
A monitoring regime will be developed for the surface water and groundwater environment at and around the Power Station as appropriate, and to be agreed with the regulator. This will include appropriate monitoring of water quality and quantity (groundwater levels and surface water flows) at and around Tre'r Gof SSSI and Cae Gwyn SSSI to identify any changes to baseline conditions, which may require management. To determine changes in flows in watercourses (including that brought about by groundwater dewatering), monthly monitoring at existing and additional flume locations would be undertaken continuously throughout construction to determine if there is a significant departure from baseline conditions. If there is, then additional mitigation may be required. Options	Monitoring would identify adverse effects on the water flows in the Tre'r Gof SSSI and the Cae Gwyn SSSI and subsequent actions would restore the water levels and flows in the watercourses (chapter D8, Application Reference Number: 6.4.8).	Restoration of groundwater levels and surface water flows to baseline conditions (chapter D8, Application Reference Number: 6.4.8).

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
include: (1) artificial groundwater recharge, (2) direct recharge to watercourses, (3) changes to drainage system, (4) sealing of fractures in excavations. (Chapter D8, Application Reference Number: 6.4.8). This mitigation would be delivered through the Surface Water and Groundwater Management Strategy contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).		
Any temporary storage of waste vegetation rising from clearance on site will not be located within 100m of Tre'r Gof SSSI or any other protected sites. Detailed within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	Reduce nutrient run-off into, and enrichment of designated sites.	This would be a requirement of the Main Construction contract. The ECoW would monitor and report on this measure.
A comprehensive air quality monitoring and reporting scheme would be developed by Horizon in discussion with the IACC and NRW, including agreement of thresholds and additional achievement criteria to ensure compliance with the appropriate environmental standards. Since the scheme is in development it will continue to be developed with the regulator and finalised for approval prior to the start of construction. Where necessary, additional modelling assessment would be undertaken to support the development of the scheme as it matures. In order to achieve the appropriate environmental standards, the scheme would include a range of measures to achieve that outcome, for example:	To reduce the predicted increases in annual mean and 24-hour mean NOx concentrations and annual mean nitrogen and acid deposition rates at key ecological receptors (e.g. Tre'r Gof SSSI).	The main achievement criteria would be to prevent an exceedance of the NO_2 AQOs. Continuous monitoring of NO_2 would be used to identify exceedances of the one-hour mean AQO and identify the need to alter the emissions management scheme. Passive NO_2 diffusion tube monitoring would also be used to track the changes in annual mean NO_2 concentrations. Regular reports to the IACC and NRW and on-line web access system to the monitoring system.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
• A fleet mix that will include newer NRMM complying with the EU Stage IV NRMM emissions standards (i.e. plant generally manufactured after 2014), which emit 80% less NOx than Stage IIIB plant. • Active and on-going management of the plant and machinery operating in close proximity to the key exceedance areas where an impact is predicted (e.g. Tre'r Gof SSSI based on modelling of the current construction scenario). • Use of continuous NO_2 monitoring to track compliance against the AQOs and mitigation objectives, including appropriate feedback mechanisms to ensure the emissions management scheme can be adapted to respond to measured exceedances or elevated concentrations. This would include measurements at suitable locations representative of long-term exposure locations identified in the assessment where exceedances of the one-hour mean AQO could occur. The continuous monitoring would be supplemented with passive NO_2 diffusion tube monitoring at a greater number of locations to track the changes in annual mean NO_2 concentrations. This mitigation would be delivered through the Air Quality Management Strategy contained within the Main Power Station Site sub-CoCP (Application		

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Reference Number: 8.7) and the Wylfa Newydd CoCP (Application Reference Number: 8.6).		
A regime of annual cutting of vegetation would be implemented during construction to reduce the increased biomass which is predicted to occur as a result of increased nitrogen deposition. Studies such as Stevens *et al*., 2013 [RD51] have shown this to be an effective technique to reduce nitrogen levels and to control competitive graminoid species. This mitigation would be delivered through Landscape and Habitat Management Strategy (Application Reference Number: 8.16).	To retain the species composition and structure within the SSSI.	Habitat monitoring, as set out in a Landscape and Habitat Management Strategy (Application Reference Number: 8.16) agreed by NRW as the statutory consultee, would be undertaken and used to determine if habitat deterioration resulting from air quality change was arising. Habitat management would be reviewed and adapted if required.
A Tre'r Gof SSSI compensation strategy would create new rich-fen habitat and enhance existing rich-fen and mire habitat across three sites within Anglesey (appendix D9-23 SSSI Compensation Strategy - Volume I, Application Reference Number 6.4.56 and appendix D9-24 SSSI Compensation Strategy - Volume II, Application Reference Number: 6.4.57). This compensation would be delivered through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and the Phasing Strategy (Application Reference Number: 8.29).	To secure and manage areas of land away from the Wylfa Newydd Development Area and create new wetland habitats which would potentially offset adverse effects. To identify adverse effects on the notable features of the SSSI.	Habitat monitoring, as set out in appendix D9-23 (Application Reference Numbers 6.4.56); and appendix D9-24 (Application Reference Numbers: 6.4.57), agreed by NRW as the statutory consultee, would be undertaken and used to determine if the compensation sites had achieved the wetland habitat objectives required. Habitat management would be reviewed and adapted if required to achieve desired habitat objectives.
As far as practicable, Horizon will manage grassland at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site to support the re-establishment of high quality coastal grassland which will support foraging	To restore the area affected by the construction of the cooling outfall to coastal grassland similar to	The establishment of grassland containing a species composition similar to that found on the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
chough through natural regeneration within the cooling outfall work area. If required, natural regeneration will be supported by the control of undesirable plant species and/or reseeding the area with seed harvested from Wylfa Head. This mitigation would be secured through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).	adjacent habitats within the designated site.	Monitoring would be undertaken to methods prescribed in the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).
A management scheme for Wylfa Head would be developed with the objective of providing optimal foraging habitat for chough within the retained habitat on Wylfa Head. Grass seeding of temporary stockpiles to mitigate loss of grassland habitat. Management of Mound A to maintain short-sward habitat conditions suitable for foraging breeding chough. This would be secured by the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).	Managing the habitats at Wylfa Head to achieve optimal conditions for foraging chough.	Reintroduction of grazing and the restoration of optimal chough foraging habitats on Wylfa Head throughout the duration of the construction period and until core foraging habitat affected by the Site Campus has been reinstated. Annual monitoring and reporting of management activities and chough foraging behaviour during the breeding and non-breeding season. Monitoring is detailed within the ecology monitoring strategy within the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).
The provision of information on the sensitivities and legal protection relevant to the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site and its associated species, and avoiding direct access from the Site Campus onto the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.	The objective would be to manage the use of sensitive habitats outwith the construction fencing by workers residing in the Site Campus, in particular	The Workforce Management Strategy (Application Reference Number: 8.5) would be successful if there are no significant effects on ecological receptors outwith the construction fencing caused by workers from the Site Campus e.g.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
	coastal footpaths and within the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site.	disturbance of chough, or degradation of habitats from over-use of existing footpaths or creation of new 'desire-line' paths in areas of coastal grassland. The reporting criteria would be via the habitat monitoring in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and chough monitoring (delivered through the ecology monitoring strategy within the Landscape and Habitat Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.16), that would both influence any changes to the Workforce Management Strategy that would be required (Application Reference Number: 8.5).
Translocation of topsoil and coppice stools from the two areas of ancient woodland to be lost to a receptor site totalling 1.3ha identified on Horizon-owned land (see figure D9-7 Application Reference Number: 6.4.101). Translocation of timber from felled trees supporting the rare *Ramalina fraxinea* lichen. This mitigation would be delivered through the Ecology and Landscape Management Strategy contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To reduce the effects of loss of areas of ancient woodland and notable species.	Successful translocation of important habitat features. Habitat monitoring of translocated topsoil, coppice and lichen, as set out in the Ecology and Landscape Management Strategy within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), would be undertaken to establish woodland of appropriate value. Habitat management would be reviewed and adapted if required.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
The management and enhancement of retained trees, scrub and hedgerows including area of Dame Sylvia Crowe designed woodland and new areas of landscaping to completed areas of landscape mounding and the control of unwanted plant species including invasive species. This additional mitigation would address both landscape and visual (see chapter D10, Application Reference Number: 6.4.10), and ecological receptors. This mitigation would be delivered through the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), and the Landscape and Habitat Management Strategy (Application Number: 8.16).	Successful establishment, maturation and longevity of existing vegetation to be retained, to reduce long-term effects of habitat loss (chapter D10, Application Reference Number: 6.4.10).	Maintenance of full extent of retained existing habitat and no deterioration in its quality, with implementation to be inspected at regular intervals (chapter D10, Application Reference Number: 6.4.10).
Landscaping to complete areas of landscape mounding as soon as practicably possible, in order to mitigate the extent of working area at any one point in time, and to reduce the duration of adverse effects of habitat loss. Agreed sequence of work to be developed further to progressively complete areas of landscape mounding on the Wylfa Newydd Development Area perimeter. Wherever possible, landscaping to be undertaken in the next available planting season following completion of defined areas of landscape mounding. This mitigation would be delivered through the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To reduce the duration of adverse effects caused by habitat loss (chapter D10, Application Reference Number: 6.4.10).	Successful planting of landscape mounds as soon as practicably possible after their completion, as per the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). See also chapter D10 Application Reference Number: 6.4.10).

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Where soils will be stored for longer than 60 days, stockpiles and temporary landscape mounding will be seeded with an appropriate low-maintenance seed mix. This mitigation would be delivered through the Ecology and Landscape Management Strategy contained within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	Reduce sediment loading to sensitive surface water features (i.e. the Tre'r Gof SSSI and the Cae Gwyn SSSI) and prevent deterioration of surface waters.	Sampling of discharge water to check concentrations post-treatment do not significantly exceed baseline water quality levels (chapter D8, Application Reference Number: 6.4.8).
Grass seeding of temporary stockpiles to mitigate loss of grassland habitat. Management of Mound A to maintain short-sward habitat conditions suitable for foraging breeding chough. This mitigation would be delivered through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To reduce adverse effects of loss of grassland and chough foraging habitat.	Preparation of performance requirements for timing and specification of seeding, including management. Annual reporting of management activities and chough foraging behaviour during the breeding and non-breeding season at Mound A.
To ensure the long-term presence of notable mammals in the local area, and achieve a source population from which the recreated or restored habitats can be repopulated, an off-site enhancement area has been secured by Horizon to the west of the Wylfa Newydd Development Area. It is approximately 15ha in area and would be managed to provide high quality habitats to support a range of species, including common toad and notable mammals. The area (including planting and creation of artificial hibernacula) would be established prior to the commencement of start of Site Preparation and Clearance Works (see Wylfa Newydd CoCP	To minimise the effects of habitat loss and fragmentation to ecological receptors.	Establishment of suitable refuge and foraging habitats, as per the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Monitoring and modification of habitat management measures, as required.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
(Application Reference Number: 8.6), and the Landscape and Habitat Management Strategy Application Document Number: 8.16). As well as providing suitable refuge and foraging habitat, the area would also provide strong corridors linking the Wylfa Newydd Development Area with the surrounding landscape, facilitating safe passage of animals from the site into suitable adjacent habitats. This would be aided by phased and directional clearance of vegetation across the Wylfa Newydd Development Area (east to west). See figure D9-9 (Application Reference Number: 6.4.101) for the location and design. The off-site compensation area would also mitigate for the loss of habitat for terrestrial invertebrates, adder and common lizard, breeding birds, over-wintering birds and bats.		
The clearance of vegetation, topsoil stripping and removal of dry stone walls would be carried out in a directional manner to encourage movement of notable mammals towards the two receptor sites located to the west of the Wylfa Newydd Development Area, and discourage their movement towards features such as the A5025 road or residential areas of Cemaes. Boundary fencing will be permeable to small mammal movement to facilitate the safe passage of animals away from the Wylfa Newydd Development Area and to reduce the effects of habitat severance. In the period between vegetation clearance and topsoil stripping, vegetation will be managed to ensure that it	This would reduce the potential for toads, reptiles and notable mammals to become trapped in islands of sub-optimal habitat or pushed up against features such as the A5025 road or residential areas of Cemaes, where species would be at greater risk of mortality and injury from traffic. Keeping vegetation short prior to top soil	Clearance in a directional manner and managing the height of vegetation is a requirement of the Main Construction contract. Regular reporting of progress by the principal contractor to Horizon and supervision of works by an ECoW would record how this approach is being adopted.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
is no higher than 50mm above ground level. This mitigation would be delivered through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	clearance will reduce the risk of the site's recolonization by those species moved off-site.	
In line with the Wylfa Newydd CoCP (Application Document Reference: 8.6), the demolition of dry stone walls and cloddiau would take place between March and September, or between November and February with supervision from the ECoW.	To mitigate potential killing and injuring of reptile, amphibian and small mammal species.	Timing of works would be part of the Main Construction Contract.
Destruction of ponds would be timed to avoid amphibian breeding season or, if not possible, works would be supervised by an ECoW. Any amphibians captured would be translocated in accordance with English Nature guidance (2011) [RD1] using artificial refuges to the nearest retained pond. This mitigation would be delivered through the Wylfa Newydd CoCP (Application Reference Number: 8.6).	To mitigate potential mortality of amphibians during clearance works.	Timing of works would be part of the Main Construction Contract. Any translocation would be supervised by the ECoW.
The provision of alternative bat roost structures (both boxes and within built structures). This mitigation would be delivered through the Ecology and Landscape Management Strategy within the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To avoid a net loss of suitable bat roosting habitat within the Wylfa Newydd Development Area.	Installation of all boxes prior to commencement of building demolition and tree felling. Annual monitoring and replacement of damaged or missing boxes throughout the duration of the construction period.
To mitigate possible disturbance to retained bat roosts, retained habitats would be enhanced and managed, and extra bat boxes to reduce the effects of noise disturbance to existing roosts would be erected	To mitigate the potential effects of disturbance to Tyn-y-Maes bat barn by	Installation of all boxes prior to commencement of Main Construction. Annual monitoring and replacement of

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
within an area of retained woodland to the east of the Power Station (see figure D9-5 Application Reference Number: 6.4.101). The boxes would be suitable for the species and roost-type potentially affected and would be installed prior to the commencement of Main Construction. The exact locations of the bat boxes would be determined by the ECoW at the time of their erection but would be positioned to maximise the likelihood of them being used by bats, providing a range of roosting conditions suitable for all species affected by the WNDA Development, and allowing for effective monitoring (detailed within the ecology monitoring strategy). This mitigation and associated monitoring would be delivered through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	providing replacement roost features.	damaged or missing boxes throughout the duration of the construction period.
Occasional barn owl roosts that would be lost at Tyddyn-Gele and The Firs would be replaced through the provision of two barn owl boxes. A further two barn owl boxes would be provided to mitigate possible disturbance to roosts at Caerdegog Isaf and Cafnan Farm. This mitigation would be delivered through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To provide alternative roost features to mitigate the effects of disturbance to retained roosts.	Installation of four barn owl nest boxes prior to the onset of activities affecting known/possible roosts at Tyddyn-Gele, The Firs, Caerdegog Isaf and Cafnan Farm. Monitoring/reporting of each new box to be undertaken annually throughout the construction period.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Additional mitigation for red squirrel would comprise the enhancement of existing habitats on Dame Sylvia Crowe's Mound by erecting artificial dreys (maximum of ten boxes) and providing a supplementary food resource (on a monthly basis during the construction period). These mitigation measures would be secured through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To retain a viable population of red squirrel within Dame Sylvia Crowe's Mound.	Annual monitoring of red squirrel within Dame Sylvia Crowe's Mound would be undertaken during the construction period.
Mud snail would be translocated to an existing wetland area within the receptor site for notable wildlife (see figure D9-9 Application Reference Number: 6.4.101). This mitigation would be delivered through the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).	To offset the loss of Tregele pond through the translocation of mud snails and the creation of new ponds with the potential to develop into suitable habitat.	Monitoring of habitats and species surveys would be undertaken at intervals and to methods prescribed in the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).
Where practicable, construction lighting would be designed to reduce sky glow, glare and light spill onto sensitive ecological receptors (i.e. bats, breeding and wintering birds, otter, water vole, notable mammals, red squirrel and chough) to below thresholds where significant effects are predicted. This mitigation would be delivered through the General Site Management Strategy contained within the Wylfa Newydd CoCP (Application Reference Number: 8.6).	The lighting design would be developed using the best available technologies to reduce light spill onto sensitive receptors to below thresholds where significant effects would be predicted. Best available technologies would include: the use of a CMS (Central Management System) to reduce or switch off lighting	Preparation of lighting design in accordance with the General Site Management Strategy within the Wylfa Newydd CoCP (Application Reference Number: 8.6), with implementation to be inspected at regular intervals.

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
	when not required; use of back shields, bunds, etc. to avoid/reduce light spill and glare onto adjacent areas; luminaires and coatings of lowest level and most appropriate colour temperature to achieve requirements (e.g. Philips ClearField technology, which emits a subtle red-green light), with no lighting above horizontal and best achievable colour rendering, where humans can judge perception at night without interfering with ecological receptors.	

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Operation

Table D9-11 Additional mitigation measures - operation

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Long-term botanical monitoring of Tre'r Gof SSSI which would identify the need for any adaptive management. The management of the Ecological Compensation Sites would contribute to off-setting any potential adverse effects. This mitigation would be secured through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).	To identify any changes to baseline conditions so that appropriate additional mitigation can be implemented. To create and manage new and existing wetland habitats at the selected sites away from the Wylfa Newydd Development Area.	Habitat monitoring, as set out in a Landscape and Habitat Management Strategy (Application Reference Number: 8.16) agreed by NRW as the statutory consultee, would be undertaken at the selected compensation sites. Habitat management would be reviewed and adapted if required to achieve desired habitats.
As per table D9-10, operational monitoring of water quality and quantity would be undertaken at the Tre'r Gof SSSI and the Cae Gwyn SSSI to identify any changes to baseline conditions. Monitoring would be in line with the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13).	To identify any changes to baseline conditions so that appropriate additional mitigation can be implemented.	Restoration of groundwater levels and surface water flows to baseline conditions, where practicable.
As per table D9-10, operational monitoring of air quality would be undertaken at the Tre'r Gof SSSI to identify any changes to baseline conditions during the commissioning of generators. Monitoring would be in line with the Wylfa Newydd CoOP (Application Reference Number: 8.13).	To identify any changes to baseline conditions so that appropriate additional mitigation can be implemented.	Restoration of air quality to baseline conditions and/or appropriate habitat management, where practicable.

Decommissioning

Table D9-12 Additional mitigation measures - decommissioning

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
None identified at this stage.	N/A	N/A

9.7 Residual effects

9.7.1 This section describes the residual effects for terrestrial and freshwater ecology having taken into account the application of embedded mitigation, good practice mitigation and additional mitigation described above. Table D9-13 provides a summary of significant residual effects identified post application of additional mitigation for the construction and operation phases.

9.7.2 It is not possible to identify significant adverse effects for the decommissioning phase at this stage.

9.7.3 Additionally, all effects of minor significance or greater identified in the assessment of effects section are summarised in appendix I3-01 Master residual effects table (Application Reference Number: 6.9.8).

Tre'r Gof SSSI

9.7.4 A major adverse residual effect to the Tre'r Gof SSSI is predicted as a result of hydrological changes during construction and operation. Embedded, good practice and additional mitigation would all be applied to reduce the effects of hydrological change by working to maintain water quality and quantity at baseline conditions. However, there is uncertainty relating to the potential effectiveness of the embedded drainage design in maintaining the quality and quantity of water sources that feed the SSSI. Monitoring would be undertaken to assess the efficacy of the Surface Water and Groundwater Management Strategy (and Air Quality Management Strategy) (both in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)) and to identify any changes compared to baseline levels or exceedances of permitted levels. Botanical monitoring would also be undertaken as part of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). The combined results of the monitoring studies would inform the requirement for adjustments to the design/implementation of mitigation measures.

9.7.5 In addition to monitoring, a compensation package would be provided and managed by Horizon, which is designed to enhance areas of existing rich fen habitat within Anglesey, and to create new areas of rich fen habitat to offset potential effects to the Tre'r Gof SSSI. This compensation package would be secured through the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.7.6 If monitoring of the Tre'r Gof SSSI suggests that embedded mitigation, Air Quality Management Strategy and Surface Water and Groundwater Management Strategy (both in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7)) have been successful, the compensation site(s) would still be provided and managed by Horizon; this would represent a significant net-gain in wetland habitat, with additional benefits also likely for invertebrates, breeding and wintering birds, small mammals and bats.

Ancient woodland

9.7.7 Loss of ancient woodland during construction would be a major adverse residual effect.

9.7.8 Ancient woodland is considered an irreplaceable resource and an ancient woodland ecosystem cannot be moved [RD80]. Whilst the translocation of ancient woodland soil to a new (larger) site is proposed as a compensation measure for the loss of ancient woodland during construction, it is not possible to replicate the same conditions at another site and thus it will no longer be ancient woodland. However, it is possible that translocation of the soils to a new site, which would then be planted with typical native woodland tree and shrub species, could support the development of an ecosystem which contains some of the plants and fungi of the former ancient woodland and is of potentially greater biodiversity value than the poor quality woodland recorded at the two ancient woodland sites that would be lost.

Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site

9.7.9 A moderate adverse effect to the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site was assessed following the combined effect of the temporary loss of 1.1ha habitat as a result of the cooling water outfall and the potential degradation of habitats caused by pressure from workers occupying the Site Campus during construction. No adverse effects were identified during operation.

9.7.10 The loss of habitat would be addressed through the provision of additional mitigation to restore the affected area to habitats similar to existing. Enhancement of existing, unaffected habitat is also proposed as good practice mitigation within the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). This would include control of bracken and scrub with the intention of maximising areas of habitat for which the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site is designated i.e. coastal grassland.

9.7.11 The potential for workers accommodated in the Site Campus to cause habitat degradation would be controlled through the provisions of the Workforce Management Strategy (Application Reference Number: 8.5). This prevents direct access to the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site from the Site Campus, and provides information on the sensitivities of the habitats and species, notably chough, which are present within the wildlife site.

9.7.12 Taken together it is considered that the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and Workforce Management Strategy (Application Reference Number: 8.5) would reduce the significance of the effect of habitat loss, fragmentation or modification on the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site from a moderate adverse effect to a minor adverse effect.

Fungi

9.7.13 The combined loss of grassland habitats and potential for degradation due to pressure from workers resident in the Site Campus were assessed as potentially resulting in a moderate adverse effect on fungi.

9.7.14 Measures to enhance coastal grassland at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site, the key high value area for fungi, and to provide a more species diverse grassland sward across sympathetically managed agricultural land, are likely to benefit the species group. These are detailed within the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

9.7.15 It is also assessed that the effects of increased visitor pressure from workers using areas outwith the construction fencing for recreation would be controlled through the provisions of the Workforce Management Strategy (Application Reference Number: 8.5) which include providing information on the sensitivity of areas such as the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site where the higher value areas for fungi are located.

9.7.16 With the application of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and Workforce Management Strategy (Application Reference Number: 8.5), it is therefore assessed that the residual effect on fungi would reduce from moderate adverse, to a minor adverse effect.

Chough

9.7.17 Following the application of additional mitigation, minor adverse residual effects are predicted for chough affected by habitat loss/fragmentation and noise and/or visual disturbance. Habitat management and enhancement (see Landscape and Habitat Management Strategy (Application Reference Number: 8.16)) at Wylfa Head is expected to reduce the reliance of foraging chough on habitats affected by construction activity (notably the construction, operation and decommissioning of the Site Campus) by increasing the area of suitable habitat in retained areas that are unaffected by construction activities and closer to the nesting site. This mitigation would be complemented by the supplementary feeding of chough at Wylfa Head and, in the medium-term, the management of Mound A to maintain short-sward habitat conditions suitable for foraging chough. Furthermore, disturbance of habitats on the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site by workers from the Site Campus would be controlled by the measures within the Workforce Management Strategy (Application Reference Number: 8.5), as additional mitigation. The combined effect of this mitigation would be to avoid a net loss of suitable habitat within the core foraging range of breeding and non-breeding chough, especially in areas that would be undisturbed by construction activities. The significance of effects is therefore considered to reduce from moderate to minor adverse following the application of additional mitigation.

9.7.18 It is assessed that the relevant magnitude of change for each receptor would not increase as a result of any combined effect and as such the residual effect for each would remain unchanged from those described above.

9.7.19 Potentially significant residual effects on ecological receptors during decommissioning, identified as valuable in the current baseline, are considered possible for those receptors sensitive to changes in air quality and hydrology and particularly susceptible to disturbance via noise, vibration and lighting. These effects are considered likely to be temporary for the duration of the impacting activities. The works required to decommission the Power Station would be subject to a separate EIA which would assess in detail the effects against the baseline conditions at that time.

9.7.20 The design of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) incorporates the reinstatement, creation and enhancement of significant areas of habitat which would be of benefit to those ecological receptors present within the Wylfa Newydd Development Area. These habitats would replace the existing baseline condition which is a predominantly agricultural landscape of lower biodiversity value. As such it is anticipated the provisions of the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) have the potential to result in net biodiversity gain which would preserve and possibly enhance the conservation status of the ecological receptors present.

SSSI Compensation Proposal

9.7.21 Three sites have been identified which provide opportunity to create and enhance rich-fen and mire habitat to off-set the potential significant adverse effects on Tre'r Gof SSSI. The works proposed to create and enhance this habitat are described in appendix D9-24 (Application Reference Number: 6.4.57), and an assessment of the potential effects from these works is provided in appendix D1-2 Ecological Compensation Sites: Assessment of Environmental Effects (Application Reference Number: 6.4.18).

9.7.22 The assessment concludes that there would be the potential for large-scale improvements in the quality and extent of rich-fen and mire habitat, although it is recognised that there is a degree of uncertainty in relation to the extent and quality of habitat created. As such, a moderate rather than major positive effect has been concluded for this habitat.

9.7.23 The location of two of the Ecological Compensation Sites (Cors Gwawr and Cae Canol-dydd) is designed to link isolated SSSI units: Cors Gwawr located between Caeau Talwrn and Cors Bodeilio, and Cae Canol-dydd located between two separate units of Caeau Talwrn. These SSSI units (with the exception of the southernmost unit of Caeau Talwrn at Cors Gwawr), also form part of the Corsydd Môn/Anglesey Fens SAC. The creation and enhancement of rich-fen at the two compensation sites would strengthen links between these SSSI units, and the resilience of the Corsydd Môn/Anglesey Fens SAC, which has the potential to result in extensive restoration and enhancement of these designated site receptors; a large magnitude of change. However, it is again recognised that there is a degree of uncertainty in relation to the extent and quality of habitat created and, as such, a moderate rather than major positive effect has been concluded for this receptor.

Table D9-13 Summary of residual effects

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Construction								
Tre'r Gof SSSI	High	Air quality changes	Temporary Reversible Adverse	Small	Moderate	Habitat management and monitoring.	Negligible	Minor adverse
		Hydrological changes	Permanent Irreversible Adverse	Large	Major	Monitoring and additional mitigation, as required. Provision of a compensation package of habitat enhancement and creation.	Large	Major adverse
Ancient woodland	High	Habitat loss (ID 26059 and ID 26075)	Permanent Irreversible Adverse	Large	Major adverse	Translocation of valuable ancient woodland features.	Medium	Major adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site	Medium	Habitat loss, fragmentation or modification	Temporary Reversible Adverse	Medium	Moderate adverse	Restoration of the area affected by the cooling outfall construction. Enhanced management of the wildlife site. Absence of direct access from Site Campus onto Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site and the provision of information detailing the sensitivities and legal protect afforded to the site and its key	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
						features (e.g. chough).		
		Air quality changes	Temporary Reversible Adverse	Small	Moderate	Enhanced management of habitat to avoid course graminoid species dominating the grassland sward. Fugitive dust suppression and air quality monitoring in line with those detailed within chapter D5 (Application Reference Number: 6.4.5).	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Fungi	High	Habitat loss, fragmentation or modification	Permanent Irreversible Adverse	Medium	Moderate adverse	Improved management of the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site and the provision of a more species diverse grassland sward across sympathetically managed agricultural land. Absence of direct access from Site Campus onto the Arfordir Mynydd y Wylfa - Trwyn Penrhyn wildlife site and the provision of information	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
						detailing the sensitivities and legal protect afforded to the site and its key features (e.g. chough).		
		Air quality changes	Temporary Reversible Adverse	Small	Moderate	Enhanced management of habitat to avoid course graminoid species dominating the grassland sward. Fugitive dust suppression and air quality monitoring in line with those detailed within chapter D5 (Application	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
						Reference Number: 6.4.5).		
Chough	Medium	Habitat loss, fragmentation or modification	Temporary Reversible Adverse	Medium	Moderate adverse	Habitat enhancements at the Arfordir Mynydd y Wylfa - Trwyn Penrhyn Wildlife Site and supplementary feeding of chough. Provision of grassland habitats which provide optimal foraging habitat for chough, including seeding of landscape mounds.	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
		Disturbance	Temporary Reversible Adverse	Medium	Moderate adverse	The Workforce Management Strategy (Application Reference Number: 8.5) would provide workers with information on the sensitivity of Wylfa Head as a nesting site, together with the legal status of the species. There would be no direct access onto Wylfa Head from the Site Campus, discouraging the use of the area for recreation.	Small	Minor adverse

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Operation								
Tre'r Gof SSSI	High	Hydrological changes	Permanent Irreversible Adverse	Large	Major adverse	Hydrological and botanical monitoring would be undertaken in agreement with NRW and if required the drainage system would be modified (if possible). Provision of a compensation package of habitat enhancement and creation.	Large	Major adverse
Decommissioning								
Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage	Not identified at this stage

Receptor (or group of receptors)	Value of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
SSSI compensation								
Caeau Talwrn SSSI Cors Bodeilio SSSI Corsydd Môn/Anglesey Fens SAC	High	Habitat enhancement	Permanent Reversible Positive	Large	Moderate	Not identified at this stage	Large	Moderate
Terrestrial habitats (rich fen/mire habitat)	High	Habitat creation and enhancement	Permanent Reversible Positive	Large	Moderate	Not identified at this stage	Large	Moderate

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9.8 References

Table D9-14 Schedule of references

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