HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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1 Ecological Compensation Sites: Assessment of environmental effects

1.1 Introduction

1.1.1 The Wylfa Newydd Project has the potential to cause significant residual environmental effects on Tre'r Gof Site of Special Scientific Interest (SSSI), principally resulting from hydrological changes during construction and operation within the Wylfa Newydd Development Area (WNDA). Embedded, good practice and additional mitigation would all be applied to reduce the effects of hydrological change but there is uncertainty relating to their potential effectiveness in maintaining the quality and quantity of water which supports the SSSI. Full details of the assessment of the effects on Tre'r Gof SSSI are provided in chapters D8 (surface water and groundwater) (Application Reference Number: 6.4.8) and D9 (terrestrial and freshwater ecology) (Application Reference Number: 6.4.9) of this Environmental Statement.

1.1.2 In order to offset the potential adverse effects on Tre'r Gof SSSI, Horizon has committed to delivering a compensation package which would create new areas of rich-fen habitat and enhance areas of existing rich-fen habitat at three sites within Anglesey, henceforth referred to as the 'Ecological Compensation Sites'. These ecological compensation proposals have been informed by discussions within a Technical Advisory Group (TAG) consisting of representatives from Horizon, Jacobs, the Isle of Anglesey County Council (IACC) and Natural Resources Wales (NRW).

1.1.3 Whilst the creation of compensatory habitat is proposed in order to offset adverse ecological effects, the creation of that habitat has the potential to lead to other environmental effects. An assessment has therefore been carried out of the environmental effects of the creation of these proposed ecological compensation measures, and the findings of that assessment are reported in this appendix to the Environmental Statement.

1.2 Description of the development

Design proposals

1.2.2 The outline design proposals for each site are set out in appendix D9-23 (SSSI compensation strategy - volume II) (Application Reference Number: 6.4.57). Detailed design information will be prepared in accordance with the habitat and landscape principles relating to the Ecological Compensation Sites in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16) and submitted to the IACC for approval. Development of the Ecological Compensation Sites will be undertaken in accordance with the approved design details. These measures will be secured through the Development Consent Order (DCO).

1.2.3 The design proposals set out in appendix D9-23 (Application Reference Number: 6.4.57) have been assessed within this report and the following

sections summarise the activities proposed at each of the Ecological Compensation Sites.

Cae Canol-dydd

Location and existing conditions

1.2.4 The location of Cae Canol-dydd is shown on figure 1-1 in Appendix D9-24 (SSSI Compensation Strategy – Volume II) (Application Reference Number: 6.4.57). It is located approximately 1.6km northeast of Llangefni, in central Anglesey. The site includes an area included within the Caeau Talwrn SSSI and connects it to another area within the SSSI to the south.

1.2.5 Caeau Talwrn SSSI supports internationally important rich-fen habitat, included in the Corsydd Môn Special Area of Conservation (SAC). Rich-fen habitat is also present in most of the valley head in the northern part of the site. The remainder of the site has been drained and converted to improved pasture.

1.2.6 The Afon Canol-dydd, an ordinary watercourse, flows through the site. An unnamed ordinary watercourse discharges into the Afon Canol-dydd within the site, and a further tributary of the Afon Canol-dydd runs along the southern boundary of site along the valley to the southeast.

Proposed habitat creation

1.2.7 The proposed habitat creation works are shown on figure 3-1 in Appendix D9-24 (Application Reference Number: 6.4.57). The works outside of the Caeau Talwrn SSSI would comprise the following:

- creation of access tracks;
- stripping of topsoil to approximately 200mm to 300m depth, yielding approximately 23,000m^3 (assuming a 300mm depth strip) of topsoil;
- landscaping in order to lower the land level and expose a nutrient-poor, calcium-rich mineral substrate for vegetation establishment;
- topsoil storage for up to three years in dedicated locations on site, in mounds no greater than two metres high;
- reuse of the topsoil off-site (refer to materials management section for further details);
- drainage modifications to reverse the artificial drainage of the site;
- fencing to exclude stock from the habitat creation areas; and
- seeding and planting of key species.

Proposed habitat enhancement

1.2.8 Black bog-rush and purple moor-grass tussocks would be cut back in the part of the site that is within Caeau Talwrn SSSI, in order to create a patchwork of short open areas while retaining some tussocks; particularly those supporting calcifugous and other vegetation.

Proposed habitat management

1.2.9 The eventual long-term management of the site would involve low-intensity grazing. The site physically connects existing areas of designated and un-designated rich-fen habitat, and grazing management would therefore seek to manage this entire rich-fen unit as a whole, where possible. This would allow for the better management of existing fen, especially small, fragmented areas, and in the long term would be conducive to the dispersal of rich-fen plant species from existing habitat.

Proposed public access enhancements

1.2.10 A Public Right of Way (PRoW) runs through Cae Canol-dydd but access is currently difficult due to overgrown hedges between fields, deep ditches obstructing access across areas of pasture and wet conditions in existing fen habitat.

1.2.11 Public access to the site would be improved through the compensation proposals by the clearance of obstructions along the PRoW and the construction of a boardwalk (improving access during periods of wet weather).

Cors Gwawr

Location and existing conditions

1.2.12 The location of Cors Gwawr is shown on figure 1-1 in Appendix D9-24 (Application Reference Number: 6.4.57). The site is situated approximately 3km northeast of Llangefni in central Anglesey, and covers an area of approximately 20.5ha.

1.2.13 The site borders Cors Bodeilio SSSI to the east, and Caeau Talwrn SSSI lies approximately 30m to the west, separated from the site by a road. Cors Bodeilio SSSI and Caeau Talwrn SSSI support internationally important fen habitat, included in the Corsydd Môn SAC. Part of Cors Bodeilio SSSI is also a National Nature Reserve (NNR).

1.2.14 The site lies at the head of a shallow valley, sloping gently downwards towards the northeast. The high ground along the west extends northeast into the valley as two low elongated hills, creating three sub-valleys which extend towards the centre of site. Two springs and a number of drainage ditches are present within the site.

1.2.15 The northern part of the site has been drained and converted to improved pasture. In contrast, much of the southern part retains semi-natural fen vegetation, although this has been damaged in places due to drainage operations.

Proposed habitat creation

1.2.16 The proposed habitat creation works are shown on figure 3-1 in Appendix D9-24 (Application Reference Number: 6.4.57), and would comprise the following:

- creation of access tracks;
- stripping of topsoil to about 200mm to 300m depth, yielding approximately 16,500m^3 of topsoil (assuming a 300mm strip);
- landscaping in order to lower the land level and expose a nutrient-poor, calcium-rich mineral substrate for vegetation establishment;
- topsoil storage for up to 3 years in dedicated locations on site, in mounds no greater than two metres high;
- reuse of the topsoil off-site (refer to materials management section for further details);
- scrub removal;
- drainage modifications to reverse the artificial drainage of the site;
- fencing to exclude stock from the habitat creation areas; and
- seeding and planting of key species.

Proposed habitat enhancement

1.2.17 An area of 1.9ha of poor quality rich-fen habitat would be enhanced as part of the works. The existing species-poor, coarse vegetation would be scraped away, and green hay or other plant propagules would be introduced.

Proposed habitat management

1.2.18 The eventual long-term management of the site would involve low-intensity grazing. The site physically connects existing areas of designated and un-designated rich-fen habitat, and grazing management would therefore seek to manage this entire rich-fen unit as a whole, where possible. This would allow for the better management of existing fen, especially small, fragmented areas, and in the long term would be conducive to the dispersal of rich-fen plant species from existing habitat.

Proposed public access enhancements

1.2.19 Three PRoWs run through Cors Gwawr but access is currently difficult due to the presence of dense scrub in places, whilst an existing boardwalk which traverses wet areas in the north of the site is not adequate to cross the site during deep floods.

1.2.20 Public access to Cors Gwawr would be improved as part of the compensation proposals by clearing scrub and creating an alternative route to the existing boardwalk for use during periods of flooding.

Ty du

Location and existing conditions

1.2.21 Ty du is situated on the Llanbadrig headland to the east of Cemaes, north of the A5025. The location is shown on figure 1-1 in Appendix D9-24 (Application Reference Number: 6.4.57).

1.2.22 The site has an area of 8.1ha, and is included in the non-statutory Wildlife Site Tir Lleidiog Ty du, a site of local nature conservation importance that also includes a small mire to the northwest.

1.2.23 Ty du sits within a topographic basin formed of hills to the north, east and southwest. A large, incised drainage ditch enters the site at the southeast corner, flows west through the centre of the site and exits at the southwestern border. A network of smaller drains that originate within the site feed into this main channel from both the north and south. A septic tank is located adjacent to the site's northeastern corner and appears to be a source of nutrient enrichment in the surrounding land.

1.2.24 During site investigations, Ty du was found to comprise largely unmodified mire habitats.

Proposed habitat enhancement

1.2.25 The proposal for Ty du would aim to facilitate the regeneration and management of mire habitat, and would include the following:

- installation of management/access infrastructure (including fencing, footbridges and access points);
- 2.4ha of mire would be enhanced directly through appropriate management;
- 3.1ha of scrub-covered mire would be enhanced through scrub clearance and vegetation regeneration;
- 1.5ha of species-poor purple moor-grass-dominated mire would be enhanced through cutting and vegetation regeneration; and
- removal or repair (drainage and sealing) of the septic tank in the northeast of the site (to be replaced if its ongoing use is required).

Proposed habitat management

1.2.26 The long-term management of Ty du would principally be low-intensity grazing by suitable livestock, such as ponies or cattle. Scrub would be managed as part of routine site management and removed where it encroaches on important herbaceous communities.

Proposed public access enhancements

1.2.27 There is a PRoW across the western part of Ty du, but the route in the southwest is partly overgrown and the bridge over the main drain through the site is dilapidated and in need of repair or replacement.

1.2.28 Public access to Ty du would be improved as part of the compensation proposals. Scrub is proposed to be cleared from part of the route and a new bridge would be constructed. Bilingual signage and interpretation boards would be installed to enable the public to understand the works being undertaken, and to appreciate the importance of peatlands for nature conservation and ecosystem service provision. These measures are set out

in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

Proposed programme and plant

1.2.29 The construction works at Cae Canol-Dydd and Cors Gwawr would likely take place over a one to two-year period, in a phased manner, with not all topsoil being stripped in a single earthworks season. Topsoil storage mounds would be formed as part of construction activities, with the topsoil being stored on each site for a period of up to three years after completion of construction.

1.2.30 Where practicable the construction works would be undertaken during drier periods, typically late spring, summer time and early autumn. At Ty du, due to the smaller scale of works, it is likely that the majority of the clearance work would be completed in one season. At all sites vegetation clearance would take place in the winter months and, wherever practicable, hedgerows, trees and walls would be retained.

1.2.31 The plant utilised would be relatively small with low numbers of machinery used on each site. Typically for topsoil stripping this might comprise a single tracked excavator, two dozers and two dump trucks. The topsoil storage mounds would typically be created using a single tracked excavator, one dozer, two tipper lorries and two dump trucks. Where possible, plant use would be combined between activities to avoid double-handling. Scrub clearance would typically be undertaken using a chainsaw or similar hand-held equipment.

1.2.32 Worker numbers would be relatively small, probably less than 10 personnel. Working hours would be:

- Monday to Friday – 07:00 to 19:00; and
- Saturday – 07:00 to 13:00.

Materials management

1.2.33 Topsoil would be stripped to a depth of around 200mm to 300mm and stored in mounds on site for a period of up to three years whilst opportunities are sought for its reuse. As the reuse is currently not known the material would be classified as a waste and Environmental Permits would be required for its storage. However, it is anticipated that an appropriate end use for the topsoil would be identified such that it would be reused sustainably and no longer classified as waste; refer to section 1.10 for further details. As topsoil is a valuable resource it is anticipated that opportunities for re-use will be readily identified, although not necessarily on Ynys Môn.

Site management

1.2.34 Ongoing management of the Ecological Compensation Sites will be carried out in accordance with management schemes to be submitted to and approved by the IACC. The management schemes will be prepared in accordance with the management principles in section 7 of the Landscape

and Habitat Management Strategy (Application Reference Number: 8.16). These measures will be secured through the DCO.

1.3 Alternatives and design evolution

1.3.1 Appendix D9-23 (SSSI Compensation Strategy – Volume I) (Application Reference Number 6.4.56) provides a detailed explanation of the process that has been followed in order to select the proposed Ecological Compensation Sites.

1.3.2 As referenced in section 1.1, a TAG, was set up with a remit to discuss and develop the Tre'r Gof SSSI compensation proposals.

1.3.3 The first step in identifying the preferred sites was to identify the objectives of the creation of compensatory habitat, and then sites could be evaluated according to their suitability to meet those objectives.

1.3.4 The objectives identified by the TAG were as follows.

- The target habitat for any compensation works would be rich-fen.
- Creation of new rich-fen habitat would be preferred over enhancement of existing habitat.
- In order to achieve 'no net loss' of biodiversity, an area for fen creation at least the size of Tre'r Gof SSSI (approx.10ha) would be sought.
- Proximity to Tre'r Gof SSSI would be preferable.

1.3.5 Initially, 13 potential sites were identified by the TAG. A further 17 sites were then added to this long list because they were adjacent to existing wetland SSSIs on Anglesey. Following a desk study and further discussions within the TAG, a short list of eight sites was agreed for site surveys and further consideration. Subsequently, one more site, actually within a SSSI, was also surveyed for its suitability for habitat enhancement works.

1.3.6 Based on the findings of the desk study and field surveys, each of the sites was evaluated against the stated objectives for the compensatory habitat. 11 of the 31 sites were identified as having medium or high potential to deliver the stated objectives.

1.3.7 The final compensation package is proposed as three sites, as follows:

- Cae Canol-dydd – named after the Afon Canol-dydd that runs along the valley, and is Welsh for 'midday pasture';
- Cors Gwawr – the site's name is Welsh for 'sunrise marsh'; and
- Ty du.

1.3.8 The final compensation proposal represents 49.4ha of land identified by Horizon, of which 16.1ha is suitable for rich-fen habitat creation, exceeding the 10ha required to meet the objective stated above, and 6.4ha is suitable for the enhancement of existing poor-quality fen habitat. Furthermore, 14.3ha of existing good-quality fen habitat would be safeguarded under this compensation proposal and the proposed Ecological Compensation Sites would extend and provide landscape connectivity between sites within the Anglesey Fens SAC.

1.4 Approach to assessment

1.4.1 The assessment of the environmental effects of the creation of the Ecological Compensation Sites has been carried out using the overarching approach set out in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1) and the topic-specific methods outlined in the topic-specific chapters of volume B (Application Reference Numbers: 6.2).

1.4.2 In cases where significant effects have been identified, those effects are reported in the relevant topic chapters in volume D (Application Reference Numbers: 6.4.3 to 6.4.11) as well as in this appendix. Non-significant effects are reported only in this appendix.

1.5 Scope

1.5.1 A number of environmental topics have been scoped out of this assessment. This is because the proposed ecological compensation works do not have the potential to cause significant environmental effects relevant to those topics, either because of the nature of the works or because of their locations. The topics that have been scoped out are listed as follows:

- socio-economics;
- coastal processes and coastal geomorphology;
- marine environment;
- radiological effects; and
- shipping and navigation.

1.5.2 All other topics that have been assessed elsewhere in this Environmental Statement have been included in this assessment.

1.5.3 The assessment covers the creation (construction) and operation of the Ecological Compensation Sites. There would be no decommissioning of the sites, and hence no assessment of a decommissioning stage has been undertaken.

1.6 Traffic and transport

Study area

1.6.2 The study area for traffic and transport covers an area along which traffic may route to and from the Ecological Compensation Sites. It includes travel to each Ecological Compensation Site based upon the design basis and activities section set out below. The study area has been determined based upon likely impacts arising from the traffic generation associated with the sites. The key highway links comprising the study area are listed in table 1-1.

Table 1-1 Study area highway links

Link reference	Location
1	A5514 - north of A55 Junction 6

Link reference	Location
2	Industrial Estate Road - east of A5114
3	Industrial Estate Road - prior to Link Road roundabout
4	Llangefni Link Road - south of B5420
5	Llangefni Link Road - north of B5420
6	B5109 Talwrn Road - north of Llangefni Link Road roundabout
7	Industrial Estate Road - between Link Road roundabout and B5109 Bridge Street
8	B5110 - north of Church Street
9	B5110 - north of B5111 junction
10	A55 - west of Junction 6
11	A5025 - north of Valley
12	A55 - east of Junction 6
13	A55 Britannia Bridge

Baseline Environment

1.6.3 Traffic surveys undertaken to inform the wider application for development consent were used to forecast the future baseline traffic flows for the key highway links presented in table 1-1. Traffic surveys include Manual Classified Turning Counts and Automatic Traffic Counts undertaken between 2014 and 2017. The full details of the locations of traffic surveys are provided in appendix C2-4 (road traffic-related effects (project-wide), DCO TA appendix D – traffic data report) (Application Reference Number: 6.3.18).

1.6.4 Baseline traffic flows have also been extracted from the local highway network (highway links 1–9 in table 1-1) from the Llangefni Link Road – Transport Assessment [RD1], for which Manual Classified Turning Counts and Automatic Traffic Counts were undertaken in March 2014 to support the application for the Link Road.

1.6.5 Assumptions were applied to the baseline traffic flows as part of this assessment to account for the redistribution in traffic upon completion of the Link Road, as follows.

- Industrial Estate Road/Link Road roundabout – assume 40% of movements previously travelling northbound along Industrial Estate Road now turn right onto Link Road (south-east bound).
- Link Road/B5420 roundabout:
  - assume 40% of movements previously turning either left or right onto B5420 towards Llangefni now continue northbound along Link Road;
  - assume 40% of movements previously travelling from B5420 (east) to Llangefni now turn left onto Link Road (southbound); and

- Link Road/B5109 Talwrn Road – assume 40% of movements previously travelling southbound along B5109 towards Llangefni now turn left onto Link Road (eastbound).

1.6.6 The baseline traffic data were factored to the 2022 forecast year using values taken from the TEMPRO (version 7.2) database. These were extracted from appendix C2-4 (Application Reference Number: 6.3.21).

1.6.7 The baseline Annual Average Traffic Flows (AADT) for 2022 are presented in table 1-2. Although a definitive programme has not been established, the summer of 2022 has been used as an indication of what worst case flows would be assuming that this future year would include the greatest volume of topsoil to be transported from the Ecological Compensation Sites. Traffic flows are shown for total vehicles and for Heavy Hoods Vehicles (HGVs).

Table 1-2 2022 Baseline AADT link flows

Link Reference	Total Traffic	HGVs
1	12,014	1,217
2	8,223	1,253
3	5,999	569
4	4,221	399
5	6,289	629
6	1,914	203
7	3,873	0
8	6,404	285
9	3,070	444
10	67,351	12,352
11	5,469	330
12	79,317	14,053
13	36,057	3,556

Design basis and activities

1.6.1 This assessment is based on the description of the proposed development set out in section 1.2 and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). A realistic worst case scenario has been assessed from a traffic and transport perspective based on the description of the proposed development.

1.6.2 The assessment considers the effects arising from HGVs only. As outlined in section 1.2, worker movements at each site are likely to be negligible, with small numbers of people arriving and departing primarily at the start and end of each day.

1.6.3 There would be approximately 39,500m^3 of topsoil removed from the Ecological Compensation Sites in total with the following proportions at each site:

- Cae Canol-Dydd – 23,000m^3 (58% of all material).
- Cors Gwawr – 16,500m^3 (42% of all material).

1.6.4 Based on the requirement to move the topsoil over three years, and assuming a realistic worst case that the topsoil is only moved during the summer months, and with the peak of activity occurring in year 2 (assumed to be 2022 solely for the purpose of this assessment), the assumptions regarding traffic associated with the works are outlined in table 1-3. These assumptions are based on a tipper vehicle having a payload of 9.5m^3 per HGV for topsoil. They assume that half of the material is moved in year 2, with the remainder being moved in years 1 and 3. Given that a single recipient is unlikely to be found for all of the material this is considered the most likely scenario.

Table 1-3 Site vehicle trip assumptions for peak of site clearance trips in year 2

Assumption	Cae Canol-Dydd	Cors Gwawr	Units
Material (topsoil) to be removed during period[1]	11,500	8,250	m^3
Payload per vehicle	9.5	9.5	m^3
Number of vehicles required	1,211	868	HGV
Length of programme during period	100	100	working days
Number of vehicles per working day (one-way)	13	9	HGV
Number of working hours per day	10	10	hour
Number of vehicles per working hour	2	1	HGV

1.6.5 For the purposes of assessment, routes for HGVs were assumed to be as follows.

- Cae Canol-Dydd route (two-way):
  - Industrial Estate Road – immediately north of the roundabout junction with Llangefni Link Road;
  - B5109 Bridge Street – at mini roundabout junction with Industrial Estate Road;
  - B5109 Bridge Street – outside property No. 30 due to carriageway narrowing measures;
  - B5110 – approximately 35m south of the priority junction with Ty N Coed;

[1] Half of total topsoil would be moved during year 2.

- B5110 – approximately 150m north of the priority junction with Ty N Coed;
- B5110 – approximately 130m and 200m south of the car garage; and
- B5110 – length of highway between 100m north of the car garage and 100m south of the Cae Canol-Dydd access.

- Cors Gwawr route (one-way):
  - B5109 Talwrn Road – approx. 260m north of roundabout junction with Llangefni Link Road;
  - B5109 Talwrn Road – length between approx. 140m south of staggered priority crossroad junction with unnamed 'C' classified road, and 160m north of same junction;
  - B5109 Talwrn Road – approx. 30m east of junction with Tai Newydd;
  - B5109 – at sharp right-turn bend at the staggered priority crossroad junction with unnamed 'C' classified road;
  - Unnamed 'C' classified road (southbound towards site access) – approx. 170m south of junction with Bwthyn Gwyn, immediately south of Bryngors farm access and at Cors Gwawr access; and
  - Unnamed 'C' classified road – length of route between site access and junction with B5420 at Ceint.

1.6.6 Table 1-3 shows that there would be 13 one-way daily movements and two hourly one-way movements, in each direction, to and from Cae Canol-Dydd. To and from Cors Gwawr there would be nine one-way daily HGV movements and one hourly one-way HGV movements, in each direction.

1.6.7 The traffic resulting from the proposals in year 2 (assumed to be summer 2022 for this assessment) per key highway link is shown in table 1-4. This is based upon the routing assumptions presented above and presents a likely worst case scenario as although it assumes the transportation of material from both sites simultaneously, not all material is moved in a single summer period. Average day traffic, equivalent to an AADT, was calculated by factoring from 100 working days to 365 days in a year and is used to calculate the combined AADT for the purposes of assessment.

Table 1-4 2022 Mitigation site traffic link flows

Link Reference	One-way or two-way	24 Hour Total Traffic - weekday	24 Hour HGVs - weekday	AADT Total Traffic	AADT Total HGVs
1	2	44	44	13	13
2	2	44	44	13	13
3	2	44	44	13	13
4	2	18	18	5	5
5	1	9	9	3	3
6	1	9	9	3	3

Link Reference	One-way or two-way	24 Hour Total Traffic - weekday	24 Hour HGVs - weekday	AADT Total Traffic	AADT Total HGVs
7	2	26	26	8	8
8	2	26	26	8	8
9	2	26	26	8	8
10	2	44	44	13	13
11	2	44	44	13	13
12	2	44	44	13	13
13	2	44	44	13	13

1.6.8 Based upon the project traffic outlined in table 1-4 the total traffic (2022 baseline plus Ecological Compensation Site traffic) is presented in table 1-5.

Table 1-5 Combined AADT link flows

Link Reference	AADT Total Traffic	AADT HGVs
1	12,027	1,230
2	8,236	1,266
3	6,012	582
4	4,226	404
5	6,292	632
6	1,917	206
7	3,881	8
8	6,412	293
9	3,078	452
10	67,364	12,365
11	5,482	343
12	79,330	14,066
13	36,070	3,569

Assessment of effects

1.6.9 The assessment of effects is based upon the method for the assessment of traffic flows outlined in chapter B3 (traffic and transport) (Application Reference Number: 6.2.3). Changes in traffic flows on the assessed links are presented in 1.6.10.

1.6.10 The analysis shows that there is one instance where the change in traffic flows is 30% or greater and therefore triggers a significant effect based upon the assessment criteria. This occurs on link 7, the Industrial Estate Road –

between Link Road roundabout and B5109 Bridge Street with an increase of 100%.

Table 1-6 2022 Change in link flows

Link Reference	24 Hour Total Traffic	24 Hour HGVs
1	0%	1%
2	0%	1%
3	0%	2%
4	0%	1%
5	0%	0%
6	0%	1%
7	0%	100%
8	0%	3%
9	0%	2%
10	0%	0%
11	0%	4%
12	0%	0%
13	0%	0%

1.6.11 The increase in traffic occurs because HGVs are forecast to change from zero to eight. This is a small absolute change and in practice the actual increase in traffic would only be short term. The effects would also be very localised in nature. Therefore, although the magnitude of change to motorised and public transport users due to localised increases in HGV flows is judged to be large, the overall significance of effect would be minor adverse.

1.6.12 Based on the small absolute changes in traffic flows, no significant effects are expected to arise for journey times, driver stress and accidents and safety.

Additional mitigation

1.6.13 No additional mitigation would be required.

Residual effects

1.6.14 There would be no significant residual effects.

1.7 Public access and recreation

Study areas

1.7.1 The study areas for public access and recreation include the footprints of the Ecological Compensation Sites plus buffer areas extending 250m from the site boundaries. These study areas have been determined based on professional judgement to enable consideration of receptors in close proximity to the Ecological Compensation Sites that may experience a loss of access or recreational amenity. These study areas are shown on figures 1, 2 and 3 of this appendix.

Baseline environment

Cae Canol-dydd

Public access

1.7.2 There are no areas of common or open access land within the Cae Canol-dydd study area.

1.7.3 PRoWs are shown on the Isle of Anglesey Definitive Map [RD2]. There is one PRoW within the Cae Canol-dydd site and a further four within 250m of the site. Descriptions of these PRoWs are set out in table 1-7. All of these PRoWs have been assigned a medium value.

Table 1-7 Public Rights of Way within Cae Canol-dydd study area

PRoW	Description
23/016/1	This PRoW is located within the Cae Canol-dydd site; it runs south from a minor road, which also forms part of National Cycle Network (NCN) Route 5, and links to the wider PRoW network. It joins PRoW 23/025/1 at the southern boundary of Cae Canol-dydd.
23/017/1	This PRoW is located to the east of Cae Canol-dydd; it runs south from a minor road, which also forms part of NCN Route 5, and links to the wider PRoW network. It joins PRoW 23/025/1 at the southern boundary of Cae Canol-dydd.
23/017/2	This PRoW is located to the east of Cae Canol-dydd and is part of the wider PRoW network. It links to PRoWs 23/025/1, 23/017/1 and 23/020/2.
23/020/2	This PRoW is located to the east of Cae Canol-dydd and is part of the wider PRoW network. It links to PRoWs 23/017/1, 23/017/2, 23/019/2, 23/019/3 and 23/020/1.
23/025/1	This PRoW is located to the south of Cae Canol-dydd and is part of the wider PRoW network. It links to PRoWs 23/016/1 and 23/017/2.

Onshore recreation

1.7.4 National Cycle Network (NCN) Route 5 runs along the northern boundary of Cae Canol-dydd. This is an on-road section of the NCN and has been assigned a medium value for onshore recreation.

1.7.5 Other local roads within the study area could be used by recreational walkers and cyclists; these have been assigned a low value for onshore recreation.

Active travel

1.7.6 Local roads within the study area could be used for active travel journeys by people living in the local area. There are no specific active travel routes, however, and local roads are of low value for active travel users.

Cors Gwawr

Public access

1.7.7 There are two PRoWs within the Cors Gwawr site and a further six within 250m of the site. Descriptions of these PRoWs are set out in table 1-8. All of these PRoWs have been assigned a medium value.

Table 1-8 Public Rights of Way within Cors Gwawr study area

PRoW	Description
23/001/2	This PRoW links the community of Talwrn to a minor road heading east to the south of the Cors Gwawr site. The path links to PRoWs 23/001/1, 23/004/2, 23/002/1 and 23/001/3.
23/001/3	This PRoW is within the Cors Gwawr site and connects to the wider PRoW network, including PRoWs 23/001/2, 23/002/1, and 23/035/1.
23/002/1	This PRoW is part of the wider PRoW network, including links to PRoWs 23/001/3, 23/001/2, 23/002/2 and 23/003/1.
23/002/2	This PRoW is part of the wider PRoW network and connects to PRoWs 23/003/1, 23/002/1 and 23/038/1. It also links into the common land to the east of the Cors Gwawr site.
23/003/1	This PRoW is part of the wider PRoW network and connects to PRoWs 23/002/1, 23/002/2, 23/004/2 and 23/004/1.
23/022/1	This PRoW is to the south of the Cors Gwawr site on the other side of the road. It is part of the wider PRoW network.
23/035/1	This PRoW is within the Cors Gwawr site and connects to the wider PRoW network through PRoWs 23/036/1 and 23/001/3
23/036/1	This PRoW is within the Cors Gwawr site; it links between two public highways as well as PRoW 23/035/1. No signage from the public highway was visible from online mapping and no obvious entry points were identifiable.

Onshore recreation

1.7.8 The Cors Bodeilio NNR is located to the west of Cors Gwawr. There is parking at the main entrance to this nature reserve and a boardwalk across the site was constructed in 2007 to assist with access across the bog [RD3]. Dogs are restricted between April and August to avoid the bird breeding season. The Cors Bodeilio NNR has been assigned a high value as it is a promoted recreational site for naturalists and other recreational users through various websites [RD4] [RD5].

1.7.9 There is an area of common land to the northeast of the Cors Gwawr site; access from the Cors Gwawr site to this common land is possible along PRoWs. The common land has been assigned a high value for onshore recreation.

1.7.10 Local roads within the study area could be used for recreational cycling and walking. They have been assigned a low value for onshore recreation.

Active travel

1.7.11 Local roads within the study area could be used for active travel journeys by people living in the local area. There are no specific active travel routes, however, and local roads are of low value for active travel users.

Ty du

Public access

1.7.12 There is one PRoW within the Ty du site and a further four within 250m of the site. Descriptions of these PRoWs are set out in table 1-9. All of these PRoWs have been assigned a medium value.

Table 1-9 Public Rights of Way within Ty du study area

PRoW	Description
20/018/1	This PRoW connects to a minor road close to the access to Tyddyn-bach and heads southwest to Cae Adda before meeting PRoWs 20/019/1 and 20/018/2. The path is clearly signed from the public highway and is accessed over a stile which appears clear of obstruction.
20/018/2	This PRoW connects to PRoWs 20/018/1 and 20/019/1 at Cae Adda and heads southwest to the A5025. This path is clearly signed from the A5025 and is accessed over a stile that is free from obstruction.
20/019/1	This PRoW connects to PRoWs 20/018/1 and 20/018/2 and heads south to the A5025, joining the A5025 near Betws. This PRoW follows the western boundary of Ty du. The path is clearly signed from the A5025 though the signed access point is overgrown. The presence of a farm gate a few metres to the west of the signed access point may be the reason for this with people accessing the path through the gate.

PRoW	Description
20/020/1	This PRoW is northwest of the Ty du site on the other side of the minor road. This PRoW heads north and joins the Wales Coast Path. This path is clearly signed from the public highway and follows a farm track which is clear of obstruction.
20/047/1	This PRoW is north of the Ty du site on the other side of the minor road. This PRoW heads north and joins to the Wales Coast Path. The path is clearly signed from the public highway with the access point clear of obstruction.

Onshore recreation

1.7.13 There are no onshore recreation features within the Ty du study area.

Active travel

1.7.14 The minor road to the north of Ty du could potentially be used by active travel cyclists from local isolated properties as part of a commute to Cemaes or Amlwch.

1.7.15 The A5025 to the south of the Ty du site could be used as an active travel route for people accessing facilities in Cemaes or Amlwch.

Design basis and activities

1.7.16 The assessment is based on the description of the proposed development set out in section 1.2 and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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. A worst case scenario has been assessed from a public access and recreation perspective based on the description of the proposed development and the mitigation outlined below.

Embedded mitigation

1.7.17 To the south of Cae Canol-dydd, a boardwalk would be constructed for the operational phase, which would enhance accessibility to PRoW 23/016/1 during periods of wet weather. This measure is set out in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

Good practice mitigation

1.7.18 As set out in section 6 of the Wylfa Newydd Code of Construction Practice (Wylfa Newydd CoCP) (Application Reference Number: 8.6), PRoWs would be kept open or temporarily diverted wherever practicable throughout construction. However, where closures are unavoidable, they would be authorised through DCO Requirement, or in cases where closures are required outside of the Order Limits, by using the appropriate means, such as Temporary Traffic Regulation Orders (TTROs) under the Road Traffic Regulations Act 1984. Should TTROs be required to temporarily close a

PRoW, they would be for the shortest duration practicable for the works required.

1.7.19 During the operational phase of the Power Station, Horizon would regularly inspect and maintain the public access infrastructure on land under its control (including the Ecological Compensation Sites), in order to allow and ensure the safe and convenient passage of members of the public. This is set out in the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13).

Assessment of effects

Construction

Cae Canol-dydd

1.7.20 PRoW 23/016/1 lies within the Cae Canol-dydd site boundary and would be affected by the proposed ecological improvements. It would be necessary either to temporarily close or divert this PRoW in order to undertake the work, especially where earthworks are involved. As set out in the good practice mitigation section above, this PRoW would be kept open or temporarily diverted wherever practicable throughout construction. Where a closure is unavoidable, it would be authorised through Order Requirement, or the appropriate means, such as TTROs. As set out in the good practice mitigation section, should TTROs be required, they would be for the shortest duration practicable for the works required. On this basis, the proposed works at the Cae Canol-dydd site would have a minor adverse effect on public access along PRoW 23/016/1 during construction.

1.7.21 There would be no effect on public access to any other PRoW as a result of construction at Cae Canol-dydd.

1.7.22 All PRoWs within the Cae Canol-dydd study area may experience a reduction in recreational amenity as a result of the work to enhance the Cae Canol-dydd site for ecological benefit. However, any disruption would be minimal and the effect on these routes would be negligible.

1.7.23 It would be necessary to use the local road network to transport construction vehicles to the Cae Canol-dydd site. However, the number of vehicle movements would be low (see section 1.2) and it is considered that they would have a negligible effect on recreational or active travel cyclists or pedestrians, including those using the NCN.

Cors Gwawr

1.7.24 There would be an adverse effect on PRoW 23/001/2 and PRoW 23/001/3 as a result of the proposed works on the Cors Gwawr site. In order to undertake the work, it would be necessary to temporarily divert or close these routes. Given the scale of the earthworks proposed it is likely that this diversion would be for more than three months and there would be a medium scale of change. However, as it appears that these PRoWs are not regularly used due to the level of overgrowth as they leave the road, this is considered to have a minor adverse effect on these two routes.

1.7.25 There would be no effect on public access to any other PRoW within the study area as a result of construction at Cors Gwawr.

1.7.26 All PRoWs within the Cors Gwawr study area could experience a reduction in recreational amenity as a result of the work to enhance the site for ecological benefit. Due to the scale of the earthworks it is considered that there would be a small magnitude of change and a minor adverse effect on these PRoWs, as there would be a temporary reduction in the tranquil nature or attractiveness of the PRoWs that may affect people's enjoyment of the route.

1.7.27 There would be a minor adverse effect on the common land to the north of the Cors Gwawr site. Due to the distance between the earthworks and the common land it is considered unlikely that there would be a noticeable reduction in the tranquil nature and attractiveness of the common land.

1.7.28 There would be a minor adverse effect on the Cors Bodeilio NNR to the north of the Cors Gwawr site. Due to the distance between the earthworks and the common land it is considered unlikely that there would be a noticeable reduction in the tranquil nature and attractiveness of the NNR.

1.7.29 It would be necessary to use the local road network to transport construction vehicles to Cors Gwawr. However, the number of vehicle movements would be low (see section 1.2) and it is considered that they would have a negligible effect on recreational or active travel cyclists or pedestrians.

Ty du

1.7.30 PRoW 20/019/1 lies within the Ty du site boundary but should not be affected by any physical works, and no PRoW diversions would be required. There would be no effect on access for users of this PRoW, and any effect on the amenity of this PRoW as a result of the noise or visual intrusion of the construction works would be negligible.

1.7.31 PRoWs 20/018/1, 20/018/2, 20/20/1 and 20/047/1 lie outside the Ty du site boundary. There would not be any restriction to access to these PRoWs as a result of the construction of the Ty du site.

1.7.32 All PRoWs within the Ty du study area may experience a reduction in recreational amenity as a result of the work to enhance Ty du for ecological benefit. However, any disruption would be minimal and the effect on these routes would be negligible.

1.7.33 It would be necessary to use the local road network to transport construction vehicles to the Ty du site. However, the number of vehicle movements would be low (see section 1.2) and it is considered that they would have a negligible effect on recreational or active travel cyclists or pedestrians.

Operation

Cae Canol-dydd

1.7.34 PRoW 23/016/1 runs through Cae Canol-dydd and access to this route would be maintained. As noted in the embedded mitigation section, a boardwalk would be constructed which would enhance accessibility to this PRoW during

periods of wet weather. The existing accessibility of the PRoW would also be improved as overgrown vegetation would be cut back through regular maintenance by Horizon, as set out in the good practice mitigation section. These measures would have a minor beneficial effect on public access.

Cors Gwawr

1.7.35 PRoW 23/001/2 and PRoW 23/001/3 would be reinstated following construction works to the Cors Gwawr site. During the operational phase of the Power Station, there would be an improvement to the existing accessibility of these routes as overgrown vegetation would be cut back and the PRoWs would be able to be accessed from the public highway (through maintenance as per the good practice mitigation section). As these routes should already be accessible, this is considered to be of negligible effect on public access.

Ty du

1.7.36 During the operational phase of the Power Station, there would be an improvement to the existing accessibility of 20/019/1 where access is restricted by overgrown vegetation (through maintenance as set out in the good practice mitigation section). As these routes should already be accessible this is considered to be of negligible effect on public access.

Additional mitigation

1.7.37 No additional mitigation would be required.

Residual effects

1.7.38 There would be no significant residual effects.

1.8 Air quality

Study areas

1.8.1 The approach for defining the study areas is described in chapter B5 (air quality) (Application Reference Number: 6.2.5). For dust emissions during the creation of the Ecological Compensation Sites, the assessment of human receptors focuses on areas extending up to 350m from the site boundaries (see figures 4, 5 and 6 of this appendix). The site boundaries represent the areas within which works would be undertaken for the creation of each Ecological Compensation Site (i.e. Cae Canol-dydd, Cors Gwawr and Ty du). The distance of 350m is based on Institute of Air Quality Management (IAQM) guidance for identifying when an assessment of dust effects is required [RD6]. Potential effects at distances greater than 350m would be less than those effects at locations closer to the site boundary, and any mitigation measures applied to protect sensitive receptors within 350m would help to reduce any possible effects beyond 350m.

1.8.2 The effects of 'trackout' also need to be determined up to 50m from the edge of the local road network, within 500m of the respective compensation site entrance(s). Trackout is defined as the transport of dust or mud from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. In line with the IAQM guidance [RD6], the assessment has also considered relevant ecological receptors up to 50m from the respective site boundaries, as shown in figures 4, 5 and 6 of this appendix.

1.8.3 A qualitative assessment of emissions from plant and machinery (i.e. Non-road Mobile Machinery) during creation of the Ecological Compensation Sites has been carried out, which considers the potential effects at the nearest receptors based on the scale of the activities. Therefore, it was not necessary to define specific study areas for the assessment of emissions from plant and machinery.

1.8.4 The change in road traffic movements associated with the creation of the Ecological Compensation Sites is anticipated to be considerably lower than the screening criteria described in chapter B5 (Application Reference Number: 6.2.5) for identifying an ‘affected’ road. Increases in annual average daily traffic flows of HGVs is a maximum of 13 on any road links at any time during the creation of the Ecological Compensation Sites or when transporting the topsoil off-site for reuse at a future date. Additional movements of cars or vans associated with workers travelling to and from each of the Ecological Compensation Sites during their creation are likely to be minimal due to the low worker numbers (i.e. about 10) as discussed in section 1.2.

1.8.5 Roads that experience a change in traffic flows below the screening thresholds referred to above do not require further assessment, as the change in concentrations of pollutants at receptors close to these roads would be imperceptible. Therefore, air quality effects at receptors close to these roads would not be significant.

Baseline environment

1.8.6 The detailed methodology and approach followed to define the baseline is outlined in appendix B5-1 (Baseline Data Synopsis Report – Air Quality) (Application Reference Number: 6.2.18).

Identification of key air quality receptors

1.8.7 This section considers the relevant human and ecological receptors that are within, or close to, the study areas for the assessment of effects on air quality associated with the Ecological Compensation Sites. These are described for each site and include both human and ecological receptors, where relevant.

Cae Canol-dydd

1.8.8 Cae Canol-dydd is bounded by areas of improved grassland for grazing sheep and cattle. The B5110 lies approximately 150m west of the site. The nearest residential property is approximately 20m west of the site. There is also a PRoW that passes directly through the site.

1.8.9 For the assessment of emissions of dust, a receptor count has been carried out for sensitive receptors within 350m of the site boundary, which identified that there are two residential properties within 20m of the site boundary. Full details of the receptor count are provided in annex 1 of this report.

1.8.10 Cae Canol-dydd lies adjacent to and connects part of the Caeau Talwrn SSSI and Corsydd Môn/Anglesey Fens SAC. The next nearest ecological receptor is Clegyrdy Bach/Neuadd Wen/Ty'n Beudy Wildlife Site which is approximately 160m southeast of the site.

1.8.11 Figure 4 shows the location of the human receptors within the study area. This figure also shows ecological receptors that are within the visible extents of the map, including those that are outside of the study area.

Cors Gwawr

1.8.12 Cors Gwawr is bounded by land used for grazing cattle and sheep with minor roads lying adjacent to the southern and western boundaries. The village of Talwrn lies approximately 200m northwest of the site. The nearest residential property is approximately 70m west of the site. A PRoW passes directly through the site.

1.8.13 For the assessment of emissions from dust, a receptor count has been carried out for sensitive receptors within 350m of Cors Gwawr, which identified that there are four residential properties within 100m of the site boundary. Full details of the receptor count are provided in annex 1 of this report.

1.8.14 Cors Gwawr is adjacent to the Cors Bodeilio SSSI, Anglesey and Llyn Fens Ramsar and Corsydd Môn/Anglesey Fens SAC, Caeau Talwrn SSSI and Tir Pori Talwrn Wildlife Site. The next nearest ecological receptor is a parcel of ancient woodland (ID 10613) approximately 750m southeast of the site.

1.8.15 Figure 5 shows the location of the human receptors within the study area. This figure also shows ecological receptors that are within the visible extents of the map, including those that are outside of the study area.

Ty du

1.8.16 Ty du is bounded by pasture land with scattered residential properties outside of the site boundary, to the north, east and west of the site. The nearest human receptor is a residential property approximately 65m north of the site. There is also a PRoW within the site boundary and a further two PRoWs within 350m of the site boundary.

1.8.17 For the assessment of emissions of dust, a receptor count has been carried out for sensitive receptors within 350m of Ty du, which identified that there are three residential properties within 100m of the site boundary. Full details of the receptor count are provided in annex 1 of this report.

1.8.18 Ty du forms part of the Tir Lleidiog Ty du Wildlife Site with the next nearest relevant ecological receptor being the Arfordir Trwyn y Buarth – Porth Wen Wildlife Site which is approximately 350m northeast of the site.

1.8.19 Figure 6 shows the location of the human receptors within the study area for Ty du. This figure also shows ecological receptors that are within the visible extents of the map, including those that are outside of the study area.

Existing air quality

1.8.20 The review of existing air quality set out in this chapter considers dust deposition, particulate matter (which includes PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO) and sulphur dioxide (SO_2) as these are the pollutants of concern in relation to construction dust or emissions from construction plant and machinery.

1.8.21 The review of baseline conditions indicates that the existing air quality in the vicinity of the proposed Ecological Compensation Sites appears to be good, and concentrations of air pollutants are generally well within the relevant Air Quality Objectives (AQOs). Through the Local Air Quality Management process [RD7], the IACC has not identified any relevant exposure areas where the AQOs are exceeded, or could potentially be exceeded in the vicinity of the respective Ecological Compensation Sites.

1.8.22 The review of baseline air quality for the Wylfa Newydd Project, is set out in appendix B5-1 (Application Reference Number: 6.2.18). This appendix also sets out all of the references from which the source data have been derived. The data available for each pollutant to describe the air quality baseline in the vicinity of the respective sites are discussed in more detail below.

NO_2 measurements

1.8.23 In 2016, the IACC undertook measurements of NO_2 at several locations close to the A5025 at Tregele and Cemaes, approximately 3km to 4km to the west-southwest of Ty du. The measured roadside annual mean concentrations ranged from 9.0µg/m^3 to 10.2µg/m^3. A measurement in Cemaes, further from the A5025 recorded an annual mean concentration of

6.7µg/m^3. The IACC also recorded annual mean concentrations of 11.2µg/m^3 and 12.7µg/m^3 at locations adjacent to the A5025 in Amlwch in 2016 (approximately 5km to the west of Ty du).

1.8.24 The IACC undertook measurements of NO_2 at several locations in Llangefni in 2014/2015 and 2016. The measured annual mean concentrations ranged from 6.5µg/m^3 to 28.0µg/m^3. The variation in measured concentrations was due to the difference in location with regard to nearby air pollution sources. The measurements ranging from 9.8µg/m^3 to 28.0µg/m^3 were recorded at urban or roadside locations in Llangefni and the lowest measured concentration of 6.5µg/m^3 was recorded at Ysgol-y-Bont in Llangefni. Cae Canol-dydd and Cors Gwawr are located in a rural setting approximately 2km to the north and northeast of Llangefni, respectively, and concentrations are likely to be lower than the urban and roadside locations recorded in Llangefni. A rural measurement near Capel Coch approximately 5km to the north of Llangefni recorded annual mean concentrations of 4.9µg/m^3 to 7.3µg/m^3 in 2012/2013.

1.8.25 All the measurements, including those at busy urban or roadside locations, were well within the annual mean AQO of 40µg/m^3.

PM_{10} and $PM_{2.5}$ measurements

1.8.26 The IACC undertook measurements of PM_{10} and $PM_{2.5}$ at the Wylfa Newydd Development Area, approximately 2.7km to the west-southwest of Ty du, 18.4km northwest of Cae Canol-dydd and 20.7km northwest of Cors Gwawr, in 2013/14 and 2016. The recorded annual mean concentrations were 14.4µg/m^3 and 14.9µg/m^3 for PM_{10} and 7.8µg/m^3 and 7.4µg/m^3 for $PM_{2.5}$, respectively. The IACC undertakes PM_{10} and $PM_{2.5}$ monitoring at other inland locations including a location at Llynfaes which is located approximately 14km south of Ty du, 7.8km east-southeast of Cae Canol-dydd and 10.2km east-southeast of Cors Gwawr. However, this monitoring location is near to a quarry and is not representative of background conditions at the Ecological Compensation Sites. The IACC has also carried out monitoring within the town of Llangefni which is over 19km south-southeast of Ty du but within 3.5km of both Cae Canol-dydd and Cors Gwawr. However, this is an urban background monitoring location and not representative of conditions at the Ecological Compensation Sites.

1.8.27 Despite the variations in locations across Anglesey and range of location types, the measured average concentrations at all monitoring locations are relatively low and are well within the PM_{10} and $PM_{2.5}$ annual mean AQOs of 40µg/m^3 and 25µg/m^3, respectively.

SO_2 and CO measurements

1.8.28 IACC, like most local authorities across the UK, has not undertaken any relevant measurements of SO_2 and CO.

1.8.29 In general, concentrations of these pollutants are relatively low and are highly unlikely to exceed the AQOs. Most local authorities across the UK do not monitor these pollutants unless there is a specific requirement such as the presence of a significant industrial source.

Dust deposition measurements

1.8.30 In 2012, 2013 and 2016, the IACC carried out measurements of dust deposition at several locations in the vicinity of the Wylfa Newydd Development Area. The measured dust deposition rates ranged from 25.8mg/m^2/day (milligrams per square meter per day) to 35.8mg/m^2/day based on monthly measurements. These were reported by the IACC to be indicative of dust deposition levels for 'open country', and are well below the levels of dust deposition that could possibly affect amenity. Suggested guidelines for the level of dust deposition which may give rise to complaints range from 140mg/m^2/day for open countryside to 200mg/m^2/day for residential areas and outskirts of towns [RD8] (based on a large number of UK measurements). The value for indicating when complaints are likely, based on site-specific baseline measurement data in the vicinity of the Wylfa Newydd Development Area, would be lower than the 140mg/m^2/day value as the baseline measurements are generally lower than the UK-wide rural dataset. The measurements are also below the levels of dust deposition rates that could potentially affect sensitive vegetation [RD9].

1.8.31 The dust deposition measurements recorded in the vicinity of the Wylfa Newydd Development Area would be broadly representative of the dust deposition in most rural locations on Anglesey that are not close to specific sources of dust. As there are no significant sources of dust emissions near to the respective Ecological Compensation Sites, the dust deposition in the vicinity of the sites would be expected to be similar.

Background mapping data

1.8.32 The Department for Environment, Food and Rural Affairs and the devolved administrations produce empirically derived background maps of pollutant concentrations. The 2013 background map concentrations for NO_2, PM_{10} and $PM_{2.5}$ and 2001 background map concentrations for SO_2 and CO for the 1km by 1km grid square representing the study areas are shown in table 1-10.

Table 1-10 Summary of background map concentrations for the study areas

Pollutant	Annual mean concentration (µg/m^3)
NO_2	4.3 – 5.0
PM_{10}	9.8 – 10.7
$PM_{2.5}$	6.7 – 7.2
SO_2	1.4 – 1.5
CO	137 - 152

1.8.33 The background map concentrations would generally be representative of concentrations experienced away from pollution sources. For example, NO_2 concentrations measured close to the A5025 or within Llangefni are higher than the background map concentration for the 1km by 1km grid squares representing the Ecological Compensation Sites.

1.8.34 The background map PM_{10} concentrations are lower than the measured PM_{10} concentrations recorded at the Wylfa Newydd Development Area (14.4µg/m^3 and 14.9µg/m^3). Although these measurements are likely to contain some contribution from sea salt particles which could explain the higher concentrations, the background map concentrations are not considered to be representative of existing PM_{10} concentrations at receptors close to the respective Ecological Compensation Sites. For $PM_{2.5}$, the background map concentrations are similar to the measured concentrations.

Evolution of the air quality baseline

1.8.35 The evolution of baseline air quality is summarised in section 5.4 of chapter B5 (Application Reference Number: 6.2.5) and described in more detail in appendix B5-1 (Application Reference Number: 6.2.18). This concluded that using existing data to represent the background concentrations of pollutants for the future year assessments was a suitably conservative approach.

Summary

1.8.36 Air quality in the vicinity of the respective Ecological Compensation Sites and surrounding areas is considered to be generally good and concentrations of pollutants are well below the relevant AQOs.

1.8.37 The construction dust assessment requires the existing PM_{10} concentration to determine the sensitivity of the area for the assessment of potential human health effects. The highest measured PM_{10} concentration recorded close to the Wylfa Newydd Development Area (a concentration of 14.9µg/m^3) was used to represent the background PM_{10} concentration at the receptor locations close to the respective Ecological Compensation Sites.

Design basis and activities

1.8.38 The assessment is based on the description of the proposed development set out in section 1.2 and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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 good

practice mitigation that would be adopted to reduce possible adverse effects by implementation of standard industry good working practice. A worst case scenario has been assessed from an air quality perspective based on the description of the proposed development and the assumptions and mitigation outlined below.

1.8.39 The main elements that could affect air quality relate to the emissions of pollutants or dust during the creation of the Ecological Compensation Sites. The potential emission sources of air pollutants and dust associated with the creation of the Ecological Compensation Sites that are considered in this assessment are:

- emissions of pollutants to air from plant and machinery (primarily Non-road Mobile Machinery); and
- dust emissions generated by activities such as earthworks or vehicle movements on dusty surfaces.

1.8.40 For dust emissions, the assessment was undertaken on the basis that all relevant activities, as categorised within the IAQM guidance [RD6] (i.e. demolition, earthworks, construction and trackout), take place at the site boundaries. This represents a conservative assumption as, in practice, most activities would not always take place at the site boundaries, increasing the distance between the source and the receptor.

1.8.41 As set out in section 1.2, topsoil would be stripped from Cae Canol-dydd and Cors Gwawr and stored on-site; it would then be reused off-site once a suitable receptor site is identified. At present there is insufficient detail available on the methods and equipment to be used at the site for the removal activities. As such, it has not been possible to include these activities in the dust assessment. Once the information is available an assessment will be undertaken. Based on information presently available, and application of professional judgement, it is not anticipated that these activities would lead to significant effects with the application of suitable mitigation similar to that proposed for the creation of the Ecological Compensation Sites, but this would be confirmed and agreed with the IACC prior to construction work commencing.

1.8.42 As discussed in annex 1 of this appendix, the limited and small-scale dust-generating activities anticipated during the compensation works at Ty du mean the effects of dust associated with the proposals at Ty du are not considered further.

Good practice mitigation

1.8.43 The assessment process has identified the good practice mitigation which would be required to control the effects of dust emissions during the compensation works. A suite of good practice mitigation measures recommended by the IAQM guidance [RD6] is set out in section 6 of annex 1 to this report. The relevant and appropriate measures to mitigate dust emissions generated by the construction works have been taken forward from those set out in annex 1 to the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main

Power Station Site sub-CoCP (Application Reference Number: 8.7). A summary of some of the measures are set out below.

- Plan site layout so that machinery and dust-generating activities are located as far as practicable from nearby sensitive receptors.
- Manage earthworks and exposed areas/soil stockpiles to prevent wind whipping using methods such as covering and re-vegetating or other alternative methods of dust suppression, such as water suppression.
- Control site runoff of water or mud.
- Comprehensive measures and working methods to prevent and reduce dust emissions at their source, including but not limited to:
- where there is a risk of dust nuisance, use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques;
- ensuring an adequate water supply on the respective sites for effective dust/particulate matter suppression/mitigation; and
- inspect on-site haul routes for in integrity and instigate any necessary repairs to the surface as soon as reasonably practicable.
- Dust deposition monitoring survey and visual inspections of the site and works (including the site boundary and off-site locations), to ensure compliance with dust management procedures and effectiveness of the mitigation measures and dust controls.
- Develop and implement procedures for liaising with stakeholders (including the local community and the IACC), including procedures and protocols for receiving complaints and subsequent investigations and responses.
- Appropriate training of construction workers to increase awareness of community issues in environmental concerns and dust management of control measures.

1.8.44 The measures to control dust emissions and monitor the effectiveness of the mitigation are specified within the air quality management strategies in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). This has been developed and informed by the measures recommended as part of the IAQM guidance [RD6].

1.8.45 The mitigation considered to represent good practice for the control of emissions from plant and machinery includes the following:

- no idling engines;
- use lower power settings where practicable;
- using mains electricity or battery-powered equipment where practicable to avoid the use of petrol or diesel generators;
- the average emissions across the fleet of relevant Non-road Mobile Machinery would be equivalent to the EU Stage IIIB emission standards

(EC Directive 97/68/EC) introduced in January 2011 for the engine sizes relevant to the works; and

- maintenance of construction plant and machinery in accordance with the manufacturers' instructions to reduce the risk of elevated emissions due to poor engine/emissions abatement performance and to ensure that any malfunctions are swiftly repaired.

1.8.46 The mitigation measures to reduce pollutant emissions are included in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

Assessment of effects

1.8.47 This section presents the findings of the assessment of air quality effects associated with the creation of the assessed Ecological Compensation Sites at Cae Canol-dydd and Cors Gwawr.

Emissions of dust

1.8.48 The assessment of the potential effects from dust emissions during the creation of the Ecological Compensation Sites is set out in full in annex 1 of this report.

Human receptors

1.8.49 The assessment has identified that there are potentially sensitive dust receptors located near to the assessed Ecological Compensation Sites. The sensitivity of the study areas, which takes into consideration the number and distance of receptors from the sites and baseline conditions, is summarised as being low for Cae Canol-dydd and Cors Gwawr with respect to emissions of PM_{10} and $PM_{2.5}$ and low to medium with respect to changes in dust deposition rates and associated effects on amenity.

1.8.50 Consideration of the meteorological conditions has identified that there is the potential for dust generated on-site to be blown towards receptors on all sides of the assessed Ecological Compensation Sites; receptors located to the north and north-northeast of where works are undertaken would be downwind more frequently.

1.8.51 The scale of the works has been used to judge the dust emission magnitude for the different types of potential dust-generating activities (categorised into demolition earthworks, construction and trackout). Prior to good practice mitigation measures being implemented, these are between small and medium dust emission magnitudes for the potential dust-generating activities associated with the creation of the assessed Ecological Compensation Sites.

1.8.52 When combining the sensitivity of the area and the dust emission magnitudes following the IAQM guidance [RD6], the proposed earthworks activities and trackout associated with the creation of the Ecological Compensation Sites are predicted to be negligible or low risk for human health effects as there is limited potential for emissions of PM_{10} and $PM_{2.5}$ to increase baseline concentrations to a value that is above the AQO set for the protection for human health. For potential dust soiling effects, there is predicted to be a low to medium risk from earthworks and a negligible risk

from trackout. Given the medium risk, there is the potential for infrequent, short term episodes when baseline dust deposition rates could be increased by an amount that residents could perceive. It should be noted there are no demolition activities and limited construction activities are anticipated for the creation of the Ecological Compensation Sites.

1.8.53 The dust risks summarised above for each relevant activity were used to identify the recommended level of good practice mitigation and control measures as part of the dust assessment (see annex 1) The proposed mitigation measures to be implemented are set out in the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7) and summarised earlier in paragraph 1.8.43. Some measures set out in annex 1 (of this appendix) that are not considered to be applicable or practicable (as the IAQM guidance covers a wide variety of development types and locations) have not been taken forward into the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). Other measures have also been amended to make them specific to the construction activities.

1.8.54 The respective sites encompass a large area but are not unusual in scale in comparison with other major infrastructure projects. There are mitigation methods available that have been successfully applied on other schemes to manage emissions of dust so that significant off-site effects have not occurred. Such measures are considered to be no more than normal good practice that would be adopted by any contractor meeting the requirements of the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). It is considered that there are no potentially dust-generating activities proposed that could not be managed using normal good practices [RD6] so as to prevent significant effects at any off-site receptor, including those located within 20m of the boundary.

1.8.55 This should be considered in conjunction with the analysis of local climatic conditions which shows that the likelihood of dust being emitted by wind erosion and being transported to off-site receptor locations is relatively low.

1.8.56 IAQM guidance [RD6] notes that, with the application of good practice mitigation measures of the type available for use on this project, the environmental effect would not be significant at any off-site receptor. IAQM guidance [RD6] also notes that, even with a rigorous package of mitigation measures in place, such as is proposed in the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7), occasional impacts may occur. The air quality management strategy within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7) provides a framework by which the level of mitigation is adapted to respond proactively (such as the use of additional mitigation measures) to the changing risk of dust emissions, so that significant effects are prevented.

1.8.57 Therefore, with the mitigation measures applied as specified in the air quality management strategies within the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7), notwithstanding the measures amended or not taken forward from the annex 1, the likely effect of dust emissions on human health and amenity during the creation of the Ecological Compensation Sites is concluded to be not significant.

Ecological receptors

1.8.58 The assessment has identified that there are potentially sensitive ecological receptors in the vicinity of the assessed Ecological Compensation Sites.

1.8.59 Cae Canol-dydd lies adjacent to and connects part of the Caeau Talwrn SSSI and Corsydd Môn/Anglesey Fens SAC. The dust assessment process identified that the risk of dust effects was medium from earthworks activities at both ecological receptors. The risk of dust effect from trackout activities was not considered as there are no ecological receptors within 50m of the respective site boundaries and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the respective site entrance(s), as per IAQM guidance [RD6].

1.8.60 Cors Gwawr lies adjacent to the Cors Bodeilio SSSI, Anglesey and Llyn Fens Ramsar and Corsydd Môn/Anglesey Fens SAC, Caeau Talwrn SSSI and Tir Pori Talwrn Wildlife Site. The dust assessment process identified that the risk of dust effects was medium from earthworks at all ecological receptors with the exception of Tir Pori Talwrn Wildlife Site where a low risk was predicted. As described above, the risk of dust effect from trackout activities was not considered for the majority of ecological receptors as they are not within 50m of the respective site boundaries and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the respective site entrance(s), as per IAQM guidance [RD6]. For those ecological receptors where trackout activities was considered, a negligible risk was predicted.

1.8.61 The dust risks summarised above for each activity were used to identify the required level of good practice dust mitigation and control measures as part of the dust assessment (see annex 1) and are summarised in paragraph 1.8.43. The potential dust effects at the assessed ecological receptors would not be significant with these good practice mitigation measures in place.

Emissions from plant and machinery

1.8.62 The IAQM guidance [RD6] specifies the following in relation to the assessment of emissions to air from construction plant and machinery:

1.8.63 “Experience of assessing the exhaust emissions from on-site plant (also known as Non-Road Mobile Machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality and, in the vast majority of cases, they will not need to be quantitatively assessed.”

1.8.64 Based on the phased construction programme over a period of between 12 to 24 months (see section 1.2), together with the relatively low number and size of plant and machinery items anticipated to operate on-site and spread

over the respective sites, the potential effect on local air quality at human and ecological receptors in the vicinity of the assessed Ecological Compensation Sites would be negligible. On this basis, and in line with the IAQM guidance [RD6], this aspect was screened out from requiring a detailed assessment and the effect on air quality from construction plant and machinery emissions is considered to be not significant.

Operation

1.8.65 There are no potentially significant air quality effects associated with the operation of the Ecological Compensation Sites.

Additional mitigation

1.8.66 In accordance with chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1), good practice mitigation measures relevant to air quality 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.

1.8.67 As no potentially significant effects have been identified, no additional mitigation measures are proposed.

Residual effects

1.8.68 This assessment has shown that, taking into account the good practice mitigation, there are no potentially significant effects and there is no requirement for additional mitigation.

1.9 Noise and vibration

Study areas

1.9.1 The study areas for the noise assessment extends to the noise sensitive properties closest, or adjacent to the Ecological Compensation Sites, where any potential noise effects would be greatest. The assessment includes on-site effects through the construction and creation of the Ecological Compensation Sites, but does not include any off-site effects from aspects such as construction-related traffic. As set out in section 1.2, material temporarily stored on site would be removed off-site within three years. Based on the traffic data available, significant road traffic noise effects are not anticipated as a result of this. This will however be confirmed once traffic data are updated and finalised closer to the time.

Cors Gwawr

1.9.2 There are a number of scattered residential properties surrounding Cors Gwawr, with the closest being approximately 40m from the site boundary. To the west of the site, 250m away, is the village of Talwrn.

Cae Canol-dydd

1.9.3 Cae Canol-dydd is 1km west of the village of Talwrn and has fewer adjacent noise sensitive properties bordering the site. Several properties are closest to the site boundary and are approximately 60m away from the proposed fen creation works.

Ty du

1.9.4 Ty du has several noise-sensitive properties 50m-100m from its boundary.

Baseline environment

1.9.5 The noise environment surrounding the sites is expected to be typical of rural locations, with relatively low noise levels. No baseline datasets exist for the noise-sensitive properties surrounding the sites, therefore suitable guidance on typical noise limits has been sought from relevant guidance listed in the references table in section 1.17.

Design basis and activities

1.9.6 The assessment is based on the description of the proposed development set out in section 1.2 of this appendix and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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. It also identifies the good practice mitigation that would be adopted to reduce possible adverse effects by implementation of standard industry good working practice. A likely worst case scenario has been assessed from a noise and vibration perspective based on the description of the proposed development and the assumptions and mitigation outlined below. Once the precise details

of the construction plant schedule and phasing are finalised the noise predictions will be re-visited for the Section 61 application.

1.9.7 The main noise-generating activity related to the construction of the Ecological Compensation Sites would be topsoil stripping and re-landscaping required for the fen creation process at Cae Canol-dydd and Cors Gwawr. This is expected to be undertaken using earth-moving machinery such as excavators and spoil distributed using dump trucks and tipper lorries and would affect receptors in proximity to Cors Gwawr and Cae Canol-dydd.

1.9.8 As set out in section 1.2, the topsoil would be reused off-site once a suitable receptor site is identified. At present there is insufficient detail available on the methods and equipment to be used on site for the removal activities. As such, it has not been possible to include these activities in this assessment. Once the information is available an assessment will be undertaken. Based on information presently available, and application of professional judgement, it is not anticipated that these activities are likely to cause significant effects, but this would be confirmed and agreed with the IACC prior to construction work commencing.

1.9.9 At Ty du the main activity which would produce noise is scrub clearance, which is expected to be undertaken with handheld equipment such as strimmers and chainsaws; this would have limited impact on the nearby receptors.

Good practice mitigation

1.9.10 In order to reduce noise levels arising from construction activities, the application of Best Practicable Means should be implemented, as defined in the Control of Pollution Act 1974 and referenced in British Standard (BS) 5228-1:2009, and as set out in the Wylfa Newydd CoCP.

1.9.11 Examples of typical Best Practicable Means are provided below.

- Locating static noisy plant in use as far away from noise sensitive receptors as is feasible for the particular activity.
- Erecting site hoarding around the perimeter of the development to screen noise as far as is practical.
- Ensuring that plant and equipment covers and hatches are properly secured and there are no loose fixings causing rattling.
- Using the most modern equipment available and ensuring such equipment is properly maintained and operated by trained staff.
- Using silenced equipment where possible, in particular silenced power generators if night time power generation is required for site security or water pumping.
- Ensuring that vehicles and mobile plant are well maintained such that loose body fittings or exhausts do not rattle or vibrate.
- Ensuring plant machinery is turned off when not in use.

- Imposition of vehicle speed limits for heavy goods vehicle traffic travelling on access roads close to receptors and ensuring that vehicles do not park or queue for long periods outside residential properties with engines running unnecessarily.
- Maintaining good public relations with local residents that may be affected by noise from the construction works. Effective communication should be established, keeping local residents informed of the type and timing of works involved, paying particular attention to potential evening and night time works and activities which may occur in close proximity to receptors. Leaflet drops, posters and public meetings or exhibitions are an effective method of keeping local residents informed.
- Provision of contact details for a site representative in the event that disturbance due to noise or vibration from the construction works occurs; ensuring that any complaints are dealt with proactively and that subsequent resolutions are communicated to the complainant.

Assessment of effects

1.9.12 To consider the effects of the habitat creation process, the following guidance documents were considered:

- BS 5228:2009-1+A1:2014 Code of practice for noise and vibration control on construction and open sites [RD10]; and
- Minerals Planning Policy (Wales) Minerals Technical Advice Note (Wales) 1: Aggregates [RD11].

1.9.13 The guidance contained in BS 5228 [RD10] provides methods for predicting receptor noise levels from construction and open sites based on the number and type of construction plant and activities operating on site with corrections to account for: the 'on-time' of the plant, as a percentage of the assessment period; distance from source to receptor; acoustic screening by barriers, buildings or topography; and ground type. It also provides a method of establishing suitable noise limits during construction periods and an overview of typical mitigation. The method contained in this document was used to estimate the noise levels at nearby properties based some assumed equipment details.

1.9.14 Minerals Technical Advice Note (MTAN) 1 Aggregates, sets out measures, including noise and vibration limits, to reduce the effects from quarrying and similar activities. The earthworks included in the Ecological Compensation Sites have some similarities with quarrying activities and it is this justification for adopting the noise limits from this document within this assessment.

Criteria

1.9.15 To indicate the level of impact of the estimated noise levels generated by the fen creation activity, the noise limits proposed in MTAN1 have been considered. This recommends that the noise limits should relate to background noise levels subject to a maximum limit of 55dB(A) for permanent operations. For temporary and short-term operations higher noise

levels are permitted, but should not exceed 67dB(A) for periods of up to eight weeks in a year at noise-sensitive properties.

1.9.16 It is considered that the level of 67dB(A) for short-term operations is an appropriate noise limit at adjacent noise sensitive properties during these temporary operations to create the Ecological Compensation Sites.

1.9.17 The approach to determining the significance of noise and vibration effects is set out in chapter B6 (noise and vibration, Application Reference Number: 6.2.6).

Construction

1.9.18 The noise levels arising from the fen creation and landscaping have been estimated assuming the equipment detailed in table 1-11 below.

Table 1-11 Typical plant and equipment noise levels

Phase	Plant / Description	BS 5228 Ref	L_{Aeq} @ 10m *(dB)*	'On-time' (%)	No.
Topsoil stripping and landscaping	Tracked excavator: 71t	C.2.2	77	80	1
	Dozer (142kW - 20t)	C.2.12	81	80	1
	Articulated dump truck (187kW - 23t)	C.2.32	74	60	2
Storage mounds	Tracked excavator: 71t	C.2.2	77	80	1
	Articulated dump truck (187kW - 23t)	C.2.32	74	60	2
	Eight-wheel tipper lorries	C.2.26	79	60	2
	Dozer (142kW - 20t)	C.2.12	81	80	1
Scrub clearance	Petrol-driven chain saw	D.2.14	86	80	1

Cors Gwawr

1.9.19 The results of the calculations undertaken for the proposed activities at Cors Gwawr are shown in table 1-12 below.

Table 1-12 Estimated noise levels at Cors Gwawr

Activity	Closest point to receiver		Mid point of site		Closest to Talwrn		Mid point to Talwrn	
	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)
Topsoil stripping and landscaping	**69**	+2	**53**	-14	**51**	-16	**49**	-18
Storage Mounds	**71**	+4	**55**	-12	**52**	-15	**49**	-18

1.9.20 At the nearest receptor location to Cors Gwawr, the noise levels during the construction of the site are estimated to be 69 to 53 dB L_{Aeq} during the topsoil stripping and 71 to 55 dB L_{Aeq} during the storage mound construction.

1.9.21 These estimated levels would be temporary in nature and the assumptions used for 'on-times' etc., are considered to be conservative estimates resulting in a likely worst case prediction which may be experienced for short durations of the construction process. The noise levels in practice would vary between the stated range of estimates.

1.9.22 Based on these results the impacts arising from construction of the site are considered to be of minor significance.

Cae Canol-dydd

1.9.23 The results of the calculations undertaken for the proposed activities at Cae Canol-dydd are shown in the table 1-13 below.

Table 1-13 Estimated noise levels at Cae Canol-dydd

Activity	Closest point to receiver		Mid point		Talwrn		Talwrn	
	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)	Predicted construction noise - LAeq (dB)	Noise impact (dB)
Topsoil stripping	**65**	-2	**52**	-15	**49**	-18	**49**	-18
Storage mounds	**67**	0	**54**	-13	**52**	-15	**51**	-16

1.9.24 At the nearest receptor location, the noise levels during the construction of the site are estimated to be 65 to 52 dB L_{Aeq} during the topsoil stripping and 67 to 54 dB L_{Aeq} during the storage mound construction.

1.9.25 These estimated levels would be temporary in nature and the assumptions used for 'on-times' etc., are considered to be conservative estimates resulting in a likely worst case prediction which may be experienced for short durations of the construction process. The noise levels in practice would vary between the stated range of estimates.

1.9.26 Based on these results the impacts arising from construction of the site are considered to be of minor significance.

Ty du

1.9.27 The noise levels arising from the scrub clearance at Ty du are likely to be generated by the use of strimmers and chainsaws to remove dense vegetation. The use of these handheld tools would result in intermittent noise occasionally being audible at receptors, with noise levels from 60dB up to 70dB LAeq being possible for small durations. However, these noise levels would not be consistent over a typical working day and any adverse effects would be temporary.

1.9.28 The temporary noise effects from scrub clearance are considered to be of no greater than minor significance and would affect a limited number of properties in proximity to Ty du.

Operation

1.9.29 Once the Ecological Compensation Sites are completed, there would be no noise generation associated with the operation or typical use of the land greater than the noise associated with the existing uses, therefore it is considered there would be no impact from the operation of the sites.

Additional mitigation

1.9.30 No specific additional mitigation is considered to be required.

Residual effects

1.9.31 The construction of the Ecological Compensation Sites would cause some minor adverse noise effects, but these would be temporary and there would not be any significant adverse effects.

1.10 Waste and materials management

Study areas

1.10.1 The study areas include all land within the footprints of Cae Canol-dydd, Cors Gwawr and Ty du.

Baseline environment

1.10.2 The baseline environment is the same as that detailed in chapter C6 (waste and materials management) (Application Reference Number: 6.3.6) of this Environmental Statement.

Design basis and activities

1.10.3 This section sets out the design basis for this assessment of effects which is based on the description of the proposed development set out in section 1.2 of this appendix and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). It sets out where any assumptions have been made to enable the assessment to be carried out at this stage. A worst case scenario has been assessed from a waste and materials perspective based on the description of the proposed development and the assumptions outlined below.

1.10.4 As part of the creation of the Ecological Compensation Sites topsoil would be stripped from Cae Canol-dydd and Cors Gwawr and stored for future use. Some habitat enhancement works would be carried out at Ty du where works would be limited to the clearance of shrubs and trees and there would be no stripping of topsoil at this site.

1.10.5 Environmental Permits would be required for the storage of the topsoil generated from the stripping of Cae Canol-dydd and Cors Gwawr, as topsoil would be considered as a waste until suitable sites where is could be re-used have been identified (see below).

1.10.6 It is proposed that two R13 bespoke Environmental Permits (storage of wastes pending any of the operations numbered R3 and R5) would be applied for from NRW to enable the storage of the topsoil (considered as a waste) on site. As part of the application a waste recovery plan would be submitted to NRW for approval. The recovery plan would show that the waste is suitable for the intended purpose (to be confirmed) and that it would not cause pollution. It has been assumed that an outlet(s) would be available and the waste would be stored for no longer than three years. It is anticipated that a future use for the waste would be identified which would lead to the sustainable reuse of the topsoil.

1.10.7 The waste would not be contaminated, would be of good quality and suitable for beneficial use based on the results of the soil investigation (see section 1.12 for further details). If required, equipment would be used on site to enable the waste for it to become a non-waste and where necessary, a separate Environmental Permit or mobile plant permit would be acquired to carry out these operations.

Assessment of effects

1.10.8 This section presents the findings of the assessment of effects for waste and materials.

Construction

Cae Canol-dydd and Cors Gwawr

1.10.9 Estimates of the volume of topsoil to be stripped from the Cae Canol-dydd and Cors Gwawr ecological compensation sites have been made based on a strip depth of 0.3m and are provided in table 1-14 below.

1.10.10 Currently there is no confirmed future use for the topsoil which would be stored under Environmental Permits, however the material would go through reprocessing to enable it to meet end of waste criteria. Therefore, as the waste would be reprocessed/recycled, the sensitivity is considered to be low.

Table 1-14 Summary of volumes of topsoil strip from Cae Canol-dydd and Cors Gwawr

Ecological Compensation Site	Volume of topsoil strip (m^3)
Cae Canol-dydd	23,000
Cors Gwawr	16,500

1.10.11 The topsoil would be managed on site and it is not anticipated that waste would be taken off site to waste management facilities. Therefore, the magnitude of change is considered to be small and the overall effect is considered to be minor.

1.10.12 Notwithstanding the above, Horizon intends to seek options for reuse of the topsoil stripped from the sites and it is anticipated that the topsoil would be reused at suitable receptor sites.

1.10.13 Hedgerows, black-bog brush, purple moor-grass tussocks and scrub would be cut/cleared at Cae Canol-dydd and Cors Gwawr during construction. Currently the quantities of woody material and cuttings that would be generated through these works is unknown. However, it is anticipated that any materials generated during these works would be used to infill ditches or create habitat piles providing wildlife enhancement. As the materials would be reused on-site, the assessment considers the sensitivity to be negligible.

1.10.14 The magnitude of change is considered to be negligible as no off-site waste management infrastructure would be required to handle these materials generated through the clearance of Cae Canol-dydd and Cors Gwawr. Therefore, the overall effect of these materials on the receiving waste management sites is considered to be negligible.

Ty du

1.10.15 Willow scrub occupying approximately 3.1 hectares of former mire habitat would be cleared as part of the ecological compensation works at Ty du. The unmanaged and over-grown purple moor-grass mire in the south of Ty du would be cut as part of the proposal in order to reinstate management and

facilitate regeneration. Currently the quantities of scrub and cuttings that would be generated through the clearance of Ty du are unknown however the material would be reused on-site in landscaping or for infilling of the main drain.

1.10.16 It is anticipated that the material generated from the clearance of shrubs and cutting of purple moor-grass at Ty du would be reused on-site. Therefore, the assessment considers the sensitivity to be negligible.

1.10.17 The magnitude of change is considered to be negligible as no off-site waste management infrastructure would be required to handle this material generated through the clearance of Ty du. Therefore, the overall effect of this material on the receiving waste management sites is considered to be negligible.

Operation

1.10.18 It is not anticipated that any waste would be generated during the operation of Cae Canol-dydd, Cors Gwawr and Ty du.

Additional mitigation

1.10.19 No additional mitigation measures have been identified for the construction or operation of Cae Canol-dydd, Cors Gwawr or Ty du.

Residual effects

1.10.20 No significant adverse effects have been identified for waste and materials management.

1.11 Soils and geology

1.11.1 Ty du has been excluded from the scope of the soils and geology assessment, as works are largely restricted to vegetation clearance and significant effects on soils and geology receptors are very unlikely to result from the proposals at that site.

Study areas

1.11.2 The potential effects on soils and geology receptors from the construction and operation of Cae Canol-dydd and Cors Gwawr are likely to be associated with direct disturbance of ground conditions on-site or the migration of contaminants to/from areas immediately adjacent to the sites. As a result, the study areas have been limited to 250m buffers around Cae Canol-dydd and Cors Gwawr, as indicated on figures 7 and 8 respectively.

Baseline environment

1.11.3 This section provides a summary of the baseline conditions for soils and geology for the study areas identified above.

1.11.4 Baseline conditions have been determined through a combination of desk-based review of commercially and publicly available data and a soil investigation, undertaken between 8th January 2018 and 18th January 2018. The soil investigation comprised 36 auger points and six soil pits at Cae Canol-dydd and 58 auger points and seven soil pits at Cors Gwawr. *In situ* observations of soil properties such as colour, texture, moisture, stoniness and mottling[2] were recorded. A number of bulk and undisturbed soil samples were also obtained for laboratory analysis, including for bulk density, organic matter, pH and total and extractable nutrients.

1.11.5 Only preliminary findings from this investigation based on the *in situ* observations were available at the time of writing, but these have been incorporated into this appendix.

Soil quality

Soil type

1.11.6 Soil types have been ascertained both through a 1:250,000 national soils map of Wales [RD12] and a 1:63,360 soils map of Anglesey [RD13]. The 1:250,000 map identifies soil associations, which are the most frequently occurring soil series in an area. Soil series are the lowest soil taxonomic unit in England and Wales and are identified on the 1:63,360 soils map. These published sources of soil information are supplemented below by the initial findings of the soil investigation.

[2] Mottling refers to the presence of spots or streaks of a particular colour, usually reddish, yellowish or white, and is generally associated with periodic waterlogging.

Cae Canol-dydd

1.11.7 Soils of the East Keswick 3 association have been mapped for the entirety of Cae Canol-dydd. This indicates well drained, fine loamy soils, which are often deep but very shallow in places; sometimes underlain by limestone.

1.11.8 Undifferentiated alluvium is mapped on the 1,63,360 soils map for the majority of Cae Canol-dydd around the river flowing through it, indicating that a soil series was not assigned. Western parts of the site away from the river are mapped as the Pentraeth soil series. These soils are described as reddish light loamy drift with limestones and are typical unmottled[3] brown earths. To the east, and possibly encroaching onto parts of the site, lie soils of the Brickfield soil series (formerly mapped as the Dyfnan soil series[4]). These soils are described as medium loamy drift with siliceous stones and are nutrient-poor, frequently waterlogged soils.

1.11.9 The initial findings of the soil investigation show an average topsoil depth across Cae Canol-dydd of approximately 0.26m below ground level (bgl), with the average total depth at 0.85m bgl. The depth of the soil profiles was most commonly limited by stoniness. The abundance of stones in the majority of subsoil horizons observed was few to common, but auger recovery was often not possible where large stones were present.

1.11.10 Very moist peaty loam topsoils over variable-textured subsoils were encountered in the northernmost land parcels of the site where areas of good quality fen are shown on figure 8.1 in Appendix D9-23 (Application Reference Number: 6.4.56). Elsewhere, the most commonly-encountered topsoil textures were silty clay loams and sandy clay loams, over clay or sandy clay subsoils. Mottles in the topsoil were generally few and faint or not visible, but moisture contents were typically high and the colours often pale, suggesting that gleying[5] may be occurring in the topsoil due to periods of waterlogging. Gleying in the subsoil was widespread, evidenced by common to many distinct mottles and pale grey soil colours.

Cors Gwawr

1.11.11 Soil of the Adventurers' 1 association are mapped for the majority of Cors Gwawr. This indicates deep peat soils, generally on flat land with groundwater levels often controlled by ditches and pumps and some undrained areas. The western extent of the site is underlain by East Keswick 3 soils.

1.11.12 Four soil series are shown on the 1,63,360 soils map for Cors Gwawr:

- Pentraeth in the northwest extent of the site;

[3] Mottling refers to the presence of spots or streaks of a particular colour, usually reddish, yellowish or white, and is generally associated with periodic waterlogging.

[4] A correlation exercise resulted in 420 series' names becoming no longer used.

[5] Gleying occurs when waterlogged, anaerobic conditions lead to the reduction and translocation of iron compounds in the soil profile.

- Brickfield in southern and northwest parts of the site;
- Adventurers' (formerly mapped as the Cadarn soil series4) across central and northern parts of the site; and
- Newbiggin (formerly Ceint[6]) for the southern tip of the site.

1.11.13 The Pentraeth and Brickfield soil series are described above. Adventurers' soils are described as humified peat and are earthy eutro-amorphous[7] peat soils. Newbiggin soils are described as reddish medium loamy drift with siliceous stones and are unmottled typical brown earths.

1.11.14 The soil investigation recorded an average topsoil depth across Cors Gwawr of approximately 0.26m below ground level (bgl), with an average total depth of 0.95m bgl. The depth of the soil profiles was most commonly limited by stoniness. Subsoils were most commonly stoneless or only contained few, fine stones, but occasionally greater stone contents were found, particularly in the northeast of the site where fen creation is proposed.

1.11.15 Peaty loam and loamy peat topsoils were commonly encountered in low-lying, wet areas of the northwest of Cors Gwawr, as well as in the northeast and southwest of the site where existing good quality and poor quality fen has been mapped respectively. Peat-textured topsoils were identified in several soil profiles within the northeast of the site where poor quality fen has been mapped. This peat was found to be amorphous and strongly decomposed.

1.11.16 Elsewhere, topsoil textures were most commonly silty clays or clays over clay or clay loam subsoils. Moisture was variable and generally related to topography. Topsoil mottling was typically not observed, or mottles were few and faint. However, as noted for Cae Canol-dydd, high moisture contents and pale colours were recorded in many cases, indicating possible gleying. Mottling in the subsoil was variable, but preliminary analyses indicate that gleying may occur most commonly in low-lying areas and where clayey subsoils are present.

Agricultural Land Classification

1.11.17 The Agricultural Land Classification (ALC) system set out within Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land [RD14] defines six grades of soils, as follows:

- Grade 1 (excellent quality);
- Grade 2 (very good quality);
- Subgrade 3a (good quality);
- Subgrade 3b (moderate quality);

[6] Note that the Ceint soil series was correlated against both the Llysfaen and Newbiggin soil series, but it is considered that Newbiggin is a closer correlation based on the locations at which Newbiggin soil profiles have been encountered in Wales.

[7] Nutrient rich, where original plant structures have been destroyed through decomposition.

- Grade 4 (poor quality); and
- Grade 5 (very poor quality).

1.11.18 Grades 1 and 2 and Subgrade 3a are determined as Best and Most Versatile (BMV) land. BMV agricultural land is the most flexible in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining it, and offers the best prospect for both food and non-food crop production.

1.11.19 Site-specific ALC survey data are not available for the two sites. However, according to Provisional ALC data for Wales [RD15], Cae Canol-dydd comprises Grade 3 (good to moderate quality) soils in the southwest and in its northern third, whilst Grade 5 soils are present across central and southern parts of Cae Canol-dydd; refer to figure 7.

1.11.20 The Provisional ALC data for Wales provide no differentiation between Subgrades 3a and 3b, such that Subgrade 3a (BMV) soils are assumed to be present where Grade 3 is mapped as a worst case scenario.

1.11.21 As such, for the purposes of assessment, Cae Canol-dydd comprises high value Grade 3 soils and low-value Grade 5 soils.

1.11.22 The southeastern half of Cors Gwawr is composed of high value Grade 3 soils and the northwestern half is composed of low-value Grade 5 soils. However, peat soils are also considered of high value and sensitivity due to the high level of soil-bound carbon they contain and their vulnerability to damage and degradation. As such, where the Adventurers' soil series is mapped, the soils are also considered high value. Refer to figure 8.

1.11.23 Observations made during the soil investigation suggest that the predominant limiting factor for ALC at both Cae Canol-dydd and Cors Gwawr would likely be soil wetness, although some areas may be limited by surface water flooding, such as the northeast of Cors Gwawr.

Artificial geology

1.11.24 Made ground is not indicated on published geological mapping [RD16] and is absent from the majority of the sites based on historical mapping (see the land contamination section for further details) and the results of the soil investigation. However, made ground will likely be present in association with roads bordering the sites and farmsteads within the study areas.

1.11.25 During the soil investigation, hardcore was also observed around a number of field entrances and it appeared that materials excavated from drainage ditches had been placed adjacent to the ditches in some areas. One auger point in the centre of Cae Canol-dydd encountered natural clay over topsoil, suggesting that it had been artificially deposited there.

1.11.26 Only confidential borehole records exist within the Cae Canol-dydd study area and none are available within the Cors Gwawr study area; thus no historical borehole records have been reviewed for this assessment.

Superficial geology

1.11.27 Published geological mapping indicated that glacial till[8] underlies the majority of Cae Canol-dydd [RD16]. However, alluvium is present as two bands across central and northeastern parts of Cae Canol-dydd, orientated southwest to northeast. Superficial deposits are also absent from a small part of the southeast of the site and from several parts of the 250m buffer of the study area to the east and north of the site. The 250m buffer is otherwise mainly underlain by glacial till with a band of alluvium to the south.

1.11.28 A band of alluvium trending southwest to northwest and approximately 60m wide is mapped across central parts of Cors Gwawr, whilst the southeast and northwest of Cors Gwawr comprise glacial till [RD16]. The majority of the wider study area is mapped as glacial till, with the band of alluvium extending to the northeast and superficial deposits absent from areas to the south, east and north. A small pocket of alluvium is also present at the southeastern extremity of the study area.

Bedrock geology

1.11.29 Published geological mapping indicates that the majority of Cae Canol-dydd is underlain by bedrock of the Ligwy sandstone formation[9], although the Clwyd limestone group[10] is present in southeastern and northeastern extents of the site [RD16]. The wider study area also comprises the Ligwy sandstone formation to the northwest and Clwyd limestone group to the southeast and north. The old red sandstone supergroup is present in the western extremities of the study area.

1.11.30 The northwestern half of Cors Gwawr is underlain by the Clwyd limestone group, and the southeastern half by schist of the Gwna Group. A small area of metabasaltic rock of the Gwna Group is present in the northeastern corner of Cors Gwawr. This spatial distribution of bedrock is reflected in the wider study area, with Clwyd limestone to the northwest, schist of the Gwna Group to the southeast and metabasaltic rock beyond the schist to the southeast. A small body of schist and mica of the central Anglesey shear zone and berw shear zone is also mapped approximately 10m to the south of Cors Gwawr.

Land contamination

Historical and current land use – potential sources of contamination

1.11.31 In order to identify former land uses of the study areas and potential sources of contamination, historical maps and regulatory and archive information have been consulted from Groundsure reports for Cae Canol-dydd [RD17] and Cors Gwawr [RD18].

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[8] Unsorted glacial material typically comprising clay with bands of sand and gravel and larger rock fragments up to boulder size (formerly referred to in the UK as 'boulder clay').

[9] Cross-bedded sandstones, pebbly sandstone and conglomerates with subordinate siltstone and mudstone beds.

[10] Diverse range of limestones with subordinate sandstone and mudstone units.

1.11.32 The earliest available historical maps for Cae Canol-dydd (1888–1889) show the site to comprise agricultural land, with rough pasture in central parts, two springs in the north, a small stream flowing north to south, and a small area of marshland in the south. The wider study area is occupied mainly by isolated farmsteads and dwellings; roads border the site to the north and west. An old quarry is mapped approximately 240m northeast of the site.

1.11.33 The Cae Canol-dydd study area has remained relatively unaltered since the first map editions, with only small changes to farmsteads, such as the addition of buildings. However, in 1959, the road to the west of the site was first annotated as the B5110 with minor alterations to its layout and possible widening. A pylon has been mapped in the northern part of the site since 1969, with overhead lines running from southeast to northwest. Besides these changes, there have been alterations to the hydrology of the site, with field drains indicated in some maps and marshland annotated in different parts of the site; this could be associated with local infilling of ground to alter site drainage. A well has also been mapped in the position of the northernmost spring since 1972.

1.11.34 Cors Gwawr is shown to comprise agricultural land with rough pasture in the south and marshland in the north on the earliest available historical maps (1888–1889). A river is shown to flow across the site from southwest to northeast, along the southern boundary of the northern section of the site, and then between the northern and southern sections of the site. A series of drains are present across the site, although these are not annotated as such until the 1970s. The wider study area is predominantly composed of agricultural land, with isolated farmsteads and marshland and ponds to the northeast. A limekiln and an old quarry are mapped approximately 40m to 50m north of the site respectively. A pit is also visible approximately 150m to the south. Roads run adjacent to the northern, southwestern and southeastern boundaries of the site.

1.11.35 Cors Gwawr has remained relatively unchanged to the present day, although a number of dwellings and alterations to farmsteads are shown on mapping. A small stream is visible within the marshland to the northeast in 1899 and a well is indicated in the south of the site in 1900. A quarry is shown in 1919 approximately 220m to the south. However, this quarry and the pit approximately 150m to the south are no longer annotated by 1972, suggesting they may have been disused/infilled. The limekiln to the north is no longer annotated in 1972 and scrub vegetation is present in the position of the old quarry. The stream to the northeast is no longer visible by 1970, nor are the ponds, indicating that they may have been infilled. Local infilling of ground may also have occurred for drainage purposes.

1.11.36 The Enviroinsight [RD18] indicates areas of potentially infilled land associated with the marshland and ponds in/to the northeast of Cors Gwawr, as well as the quarries to the north and south and pit to the south.

1.11.37 Both Cae Canol-dydd and Cors Gwawr are located in a radon-affected area, as greater than 30% of the properties are above the action level. However, as the proposed activities at the site do not include built development, this will not be considered further.

1.11.38 Both sites are situated in areas at low risk of unexploded ordnance [RD19].

1.11.39 Following the desk-based review summarised above, the potential sources of contamination listed below have been identified.

- Cae Canol-dydd:
- on-site – farm activities, pre-1888 to present: heavy metals, hydrocarbons pesticides/herbicides and insecticides;
- on-site – potential local infilling of ground for drainage purposes, pre-1888 to present: heavy metals, hydrocarbons and asbestos; and
- off-site – made ground associated with construction of adjacent roads: heavy metals and hydrocarbons. Due to the limited potential for contamination, this source is not considered likely to pose a risk to the site and therefore will not be considered further.
- Cors Gwawr:
- on-site – farm activities, pre-1888 to present: heavy metals, hydrocarbons pesticides/herbicides and insecticides;
- on-site – potential local infilling of marshland and ground for drainage purposes, pre-1888 to present: heavy metals, hydrocarbons and asbestos; and
- off-site – made ground associated with limekiln, old quarry, infilled ponds and marshland and construction of adjacent roads pre-1988 to present: heavy metals, hydrocarbons and ground gas. Due to the limited potential for contamination and/or their distance from the site, these sources are not considered likely to pose a risk and therefore will not be considered further.

Potential receptors of contamination

1.11.40 Relevant receptors of contamination include human health and controlled waters (surface water and groundwater). These receptors are aligned with the key receptor groups set out within *Contaminated Land Statutory Guidance* [RD20].

1.11.41 Human health receptors (high-value) have been subdivided into key groups, with different characteristics. These groups are set out below.

- Construction workers: during earthworks there is a high likelihood of contact with site soils and contact with groundwater is likely.
- Future site users: farmers and recreational users with a low likelihood of contact with site soils and groundwater and grazing livestock with a high likelihood of contact site soils and likely contact with groundwater.
- Adjacent land users: primarily agricultural land use. Low likelihood of inhalation of wind-blown dusts and contaminants from site.

1.11.42 Controlled waters comprise the receptors set out below (refer to the surface water and groundwater section for further details).

- Cae Canol-dydd study area:
- groundwater – Principal aquifer (high value) for all bedrock except old red sandstone supergroup, Secondary aquifers (low value) in remainder of underlying geology;
- surface water – unnamed ordinary watercourse (high value) and drainage ditch network (low value).
- Cors Gwawr study area:
- groundwater – Principal aquifer in Clwyd limestone (high value), Secondary aquifers (low value) in remainder of underlying geology;
- surface water – unnamed ordinary watercourse (high value), drainage ditch network (low value).

1.11.43 Although not a receptor of contamination as such, potential effects on the soil quality receptors identified earlier in this section are considered under the 'land contamination receptors' headings within the assessment of effects, since land contamination could act to reduce soil quality.

Conceptual site model

1.11.44 Potential sources, receptors and pathways of contamination have been identified and developed into initial conceptual site models, as presented below in table 1-15 and Table 1-16.

1.11.45 The conceptual site models outline potential pollutant linkages, for which a qualitative risk assessment has been undertaken, following guidance outlined in *Contaminated Land Report 11: Model Procedures for the Management of Land Contamination* [RD21].

Table 1-15 Conceptual site model for Cae Canol-dydd

Source	Pathway	Receptor	Comments
On-site farm activities	Ingestion, inhalation, dermal contact with contaminated soil/groundwater within potential made ground	Construction workers	There is unlikely to be significant contamination present as a result of the farming activities on these sites, and as there is no indication of specific sources (such as sheep dips) being present on historical mapping. Available information indicates that the sites have been used primarily for grazing. Risks to receptors are considered to be low.
		Future site users	
		Adjacent land users	
	Leaching of contaminants through the soil to superficial and bedrock aquifers and migration of contaminants to surface waters	Principal aquifer Secondary aquifers Surface waters	
On-site potential local	Ingestion, inhalation, dermal contact with	Construction workers	Given the nature of the sites and

Source	Pathway	Receptor	Comments
infilling of ground	contaminated soil/groundwater within potential made ground	Future site users	surrounding area it is considered unlikely that the infilling of ground (if it occurred) would have included the deposition of contaminated materials; as such risks to receptors are considered to be low.
		Adjacent land users	
	Leaching of contaminants through the soil to superficial and bedrock aquifers and migration of contaminants to surface waters	Principal aquifer Secondary aquifers Surface waters	

Table 1-16 Conceptual site model for Cors Gwawr

Source	Pathway	Receptor	Comments
On-site farm activities	Ingestion, inhalation, dermal contact with contaminated soil/groundwater within potential made ground	Construction workers	There is unlikely to be significant contamination present as a result of the farming activities and risks to receptors are considered to be low.
		Future site users	
		Adjacent land users	
	Leaching of contaminants through the soil to superficial and bedrock aquifers and migration of contaminants to surface waters	Principal aquifer Secondary aquifers Surface waters	
On-site potential local infilling of ground	Ingestion, inhalation, dermal contact with contaminated soil/groundwater within potential made ground	Construction workers	The infilling of features is not proven and if infilling has occurred, it is unlikely to have been with contaminated materials; as such risks to receptors are considered to be low.
		Future site users	
		Adjacent land users	
	Leaching of contaminants through the soil to superficial and bedrock aquifers and migration of contaminants to surface waters	Principal aquifer Secondary aquifers Surface waters	

1.11.46 The conceptual site models above indicate that risks associated with the identified potential pollutant linkages are considered to be low for all identified receptor groups for both Cae Canol-dydd and Cors Gwawr.

Sites of geological importance

1.11.47 The Isle of Anglesey was designated as a European Geopark (the GeoMôn Geopark) in 2009 as a result of its outstanding geodiversity and geological heritage. Furthermore, in November 2015, the GeoMôn Geopark was designated as a UNESCO Global Geopark [RD22]. The new designation is intended to raise awareness and promote respect for the environment and integrity of the landscape. The status also expresses governmental recognition of the importance of holistic management of the Geoparks. The designation is not legislative but the key heritage sites within the Geoparks should be protected under local, regional or national legislation as appropriate.

1.11.48 As noted in chapter B7 (Introduction to the topics - soils and geology, Application Reference Number 6.2.7), sites of geological importance within the Geopark have been identified as the receptors for soils and geology

across the Environmental Statement. No sites of geological importance are present within the study areas and thus they are not considered further in this chapter.

Geological resources

1.11.49 Geological resources are defined as geological deposits that have a potentially viable economic value by virtue of the resource type or the amount of a specific deposit present.

1.11.50 At Cae Canol-dydd, a Category 1 Aggregates Safeguarding Area for high specification aggregates (carboniferous limestone) is identified, associated with the Clwyd limestone group [RD23]. In addition, Category 2 Aggregates Safeguarding Areas are mapped for sand and gravel deposits associated with superficial deposits of alluvium, and for sandstone resources associated with the Ligwy sandstone.

1.11.51 At Cors Gwawr, a Category 1 Aggregates Safeguarding Area for high specification aggregates (carboniferous limestone) is present, associated with the Clwyd limestone group [RD23]. A Category 2 Aggregates Safeguarding Area for sand and gravel resources is also mapped, associated with superficial deposits of alluvium.

1.11.52 The Clwyd limestone group was recommended for safeguarding within *Hard Rock and Sand & Gravel Safeguarding Areas in Ynys Môn* [RD24]. As such, the high specification aggregates on both sites are considered to lie within mineral safeguarding areas for the purposes of assessment.

Evolution of the baseline

1.11.53 Soil quality is the only aspect of the baseline environment likely to evolve naturally and significantly in the foreseeable future.

1.11.54 The UK Climate Projections published in 2009 indicate that increases in annual, summer and winter temperatures are likely for Wales through to at least 2100 [RD25], whilst mean precipitation levels would likely decrease for summers and increase for winters according to most modelling scenarios.

1.11.55 As ALC surveys have not been undertaken for the sites, the limiting factors for ALC are not known. However, as noted above, wetness is likely to be the predominant limiting factor for the sites based on observations made during the soil investigation. A general subtle trend towards drier soils across England and Wales is predicted [RD25]; [RD26], which could result in soil wetness becoming less of a limitation at the sites.

1.11.56 However, trends towards drier soils may also lead to the degradation of peat soils mapped and encountered at Cors Gwawr, resulting in a reduced value of that receptor.

1.11.57 In addition, flooding is predicted to increase in Wales [RD25], which may result in flooding becoming a greater limiting factor across the sites.

1.11.58 For further discussion of the effects of climate change on the Wylfa Newydd Project, refer to chapter B1 (Application Reference Number 6.2.1).

Design basis and activities

1.11.59 The soils and geology assessment has been based on the description of the proposed development set out in section 1.2 of this appendix and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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. It also identifies the good practice mitigation that would be adopted to reduce adverse effects by implementation of standard industry good working practice. A worst case scenario has been assessed from a soils and geology perspective based on the description of the proposed development and the assumptions and mitigation outlined below.

1.11.60 Cae Canol-dydd and Cors Gwawr would be developed as set out in section 1.2. The main activity of relevance to soils and geology is the stripping of topsoil to a depth of 300mm across the majority of the areas of proposed fen creation.

1.11.61 It is assumed that topsoil would be temporarily stored for a maximum of three years on-site, under Environmental Permits, until a suitable reuse has been identified (refer to section 1.10 for further details). Following this, it is assumed that the soil would be reused at a suitable receptor site.

Good practice mitigation

Land contamination

1.11.62 Section 9 of the Wylfa Newydd CoCP (Application Reference Number 8.6) sets out the overarching management strategies for dealing with land contamination. Horizon would undertake appropriate ground investigation, assessment and where necessary, remediation, to deal with any risks from land contamination that are identified.

1.11.63 In order to address any areas of unexpected contamination encountered on all sites, an unexpected contamination plan for all sites will be prepared prior to the commencement of any activities that involve ground disturbance. Processes and procedures will be established that clearly set out the method for dealing with any material affected by contamination encountered during construction works.

Pollution prevention

1.11.64 Section 10 of the Wylfa Newydd CoCP (Application Reference Number 8.6) sets out the overarching pollution management principles and pollution prevention techniques to be applied throughout the construction period. Good practice mitigation during construction would include measures such as good equipment maintenance and repair and containment systems for fuel storage areas (should these be required) to reduce leaks and spills.

Materials and waste management

1.11.65 As set out in section 9.6 of the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) the management of materials on site would be in accordance with the requirements set out within an

Environmental Permit which would be obtained to cover the storage of topsoil on site (during which time it would be legally classified as a waste, for further details refer to the waste and materials management section).

1.11.66 Section 9 of the Wylfa Newydd CoCP (Application Reference Number 8.6) includes a site waste management strategy which sets out a framework for the management of wastes to reduce the amount of waste disposed to landfill. Further details on waste management are provided in the Waste and materials management section and in chapter C6 (Application Reference Number 6.3.6).

Soil management

1.11.67 Good practice mitigation measures would be implemented during construction, following guidance on soil management such as the *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites* [RD27]. These measures would include:

- appropriate procedures for soil handling works, such as stopping works when soil moisture exceeds specific limits;
- appropriate segregation of soils, including the segregation of soils of distinctly different qualities, types or composition;
- soils would be stockpiled using methods appropriate to the soil moisture conditions;
- soil storage mounds would have slopes of 1 in 2 (approximately 25°) or less, where practicable; and
- where soils would be stored for longer than six months, stockpiles would be seeded with an appropriate low-maintenance seed mix.

1.11.68 Implementation of the soil management measures set out within section 9 of the Wylfa Newydd CoCP (Application Reference Number 8.6) and the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) would reduce effects on soil resulting from the stripping, handling and storage of topsoil.

Assessment of effects

Construction

Soil quality

1.11.69 During the proposed topsoil stripping at Cae Canol-dydd, Grade 3 (high value) soils would be stripped from the north of the site, and Grade 5 (low value) soils would be stripped from the south of the site and a small section of the northern topsoil strip area.

1.11.70 With regards to Cors Gwawr, Grade 3 (high value) soils would be stripped in the northeast and south of the site and Grade 5 (low value) soils in the northwest of the site. Within the areas of proposed soil strip, the Adventurers' soil series mostly overlaps with Grade 3 soils, such as those areas are already considered high value. The exception is a small area in the east of

the northwestern parcel of fen creation, such that the soils in this area are also considered high value.

1.11.71 During stripping and storage, the effects set out below may occur.

- Soil deformation through compaction and smearing, as a result of trafficking and handling of the soil.
- Stripping topsoil too deeply, thereby incorporating subsoil, or stripping to too shallow a depth could respectively lead to a degradation of soil quality or result in the loss of valuable topsoil.
- If soils of different types or quality are mixed during soil stripping and storage, higher quality soils may be degraded. It is particularly important to manage peat soils separately from other soil types.
- During storage, a number of biological, chemical and physical changes may occur as a result of natural compaction and anaerobic conditions in the core of the stockpile.

1.11.72 The implementation of good practice soil management measures, as identified in the design basis and activities section would reduce the potential for these effects to occur. For instance, stopping works when soil moisture exceeds specific limits would reduce the potential for compaction and smearing, and the appropriate segregation of soils would reduce the potential for mixing. As such, only small magnitudes of change would occur on the high to low-value soils identified at both Cae Canol-dydd and Cors Gwawr. Accordingly, minor adverse effects would result.

1.11.73 It should be noted that the effects should be largely reversible when the soils are reused, provided appropriate handling and aftercare measures are implemented.

Land contamination receptors

Exposure of areas of unexpected contamination

1.11.74 As noted in the baseline environment section, the risks to receptors from potential sources of contamination are low.

1.11.75 Nevertheless, there remains the potential for the exposure or mobilisation of unexpected contamination during construction which could affect construction workers (high value), Grade 3 soils (high value), Adventurers' soils (high value), Grade 5 soils (low value), surface water (high to low value) and groundwater (high to low value). Given the histories of Cae Canol-dydd and Cors Gwawr have been agricultural, it is considered unlikely that pollutant linkages would occur, with the implementation of the identified good practice mitigation measures (see the design basis and activities section) also lowering the likelihood. For all receptors, the magnitude of change would be negligible based on the low risks posed, and the effects would be negligible.

1.11.76 No effects have been identified for adjacent land users (high value) from unexpected contamination, as it is very unlikely that pollutant linkages would occur.

Pollution incidents causing soil contamination

1.11.77 During construction there is the potential for activities and pollution incidents to cause contamination on-site. This could be as a result of leaks or spills from construction plant or fuel. Any contamination resulting from such events has the potential to pose risks to construction workers (high value) or soils (high to low value).

1.11.78 However, the implementation of pollution prevention strategies e.g. good maintenance of equipment, would reduce this risk. As such, the magnitude of change would be negligible for both receptors and the resulting effects would be negligible.

1.11.79 For effects that occur to surface water and groundwater, including leaks and spills, reference should be made to the surface water and groundwater section.

Geological resources

1.11.80 Due to the relatively shallow nature of the excavations, it is unlikely that any mineral resources would be excavated during construction. There would be a loss of access to the high and medium value resources identified on both sites during topsoil stripping, but the proportions affected would be minor (<50%) for the high value Category 1 Aggregates Safeguarding Areas and the Category 2 Aggregates Safeguarding Areas for sandstone resources. The proportion of the Category 2 Aggregates Safeguarding Area for alluvium that would be affected at Cae Canol-dydd would be greater, (>50%), but in all cases, the length of time that access would be restricted for during construction would be relatively short.

1.11.81 Accordingly, the magnitudes of change for the high and medium value geological resources resulting from construction would be negligible and the effects would also be negligible.

Operation

Soil quality

1.11.82 During operation, it is intended that the remaining soils on site would be flooded more frequently in order to facilitate the creation of fen habitats. Although this may act to reduce the ALC grades of the soil, it is considered that the quality of the soils would not be reduced as such, since ALC is only one means of determining the value of the soil. By acting as a suitable substrate for fen creation, the soils would effectively be of high value in providing a valuable ecosystem service. Therefore, no effects are anticipated in this regard.

Land contamination

Unexpected contamination

1.11.83 It is unlikely that any contamination would remain within the remaining soils into the operational phase. It is also very unlikely that there would be any disturbance of unexpected contamination during operation at Cae Canol-

dydd and Cors Gwawr, since no breaking of ground is anticipated in this phase. As such, no effects are anticipated due to unexpected contamination during operation.

Geological resources

1.11.84 As Cae Canol-dydd and Cors Gwawr are both proposed as fens, this would effectively prevent access to the high and medium value geological resources beneath the site, thus sterilising them.

1.11.85 As outlined for the construction-phase assessment, the proportions affected would be minor (<50%) for the high value Category 1 Aggregates Safeguarding Area and the Category 2 Aggregates Safeguarding Area for sandstone resources, but >50% of the Category 2 Aggregates Safeguarding Area for alluvium would be affected at Cae Canol-dydd.

1.11.86 Given this change would be permanent, it is considered that the magnitudes of change for all the resources identified would be small, taking into account the proportions affected. Based on professional judgement, it is considered that the effects would be minor adverse across the identified receptors.

Additional mitigation

1.11.87 In accordance with chapter B1 (Application Reference Number 6.2.1), good practice mitigation measures relevant to soils and geology were taken into account when determining the 'pre-mitigation' significance of effects. These are detailed in the design basis and activities section.

1.11.88 No potential significant effects have been identified in the assessment of effects and therefore no additional mitigation is required.

Residual effects

1.11.89 No significant adverse effects were identified for soils and geology.

1.11.90 Minor effects identified in the assessment of effects section are summarised in appendix I3-1 (Master Residual Effects Table) (Application Reference Number: 6.9.8).

1.11.91 The following non-significant effects are likely:

- degradation of ALC Grades 3 and 5 soils at Cae Canol-dydd during construction as a result of stripping, handling and storage (minor adverse);
- degradation of ALC Grades 3 and 5 soils and Adventurers' soil series at Cae Canol-dydd during construction as a result of stripping, handling and storage (minor adverse);
- permanent sterilisation of portions of Category 1 and Category 2 Aggregates Safeguarding Areas at Cae Canol-dydd (minor adverse); and
- permanent sterilisation of portions of Category 1 and Category 2 Aggregates Safeguarding Areas at Cors Gwawr (minor adverse).

1.12 Surface water and groundwater

1.12.1 This assessment focuses on Cors Gwawr and Cae Canol-dydd. The proposed management at Ty du is scoped out of the assessment of effects on the water environment as the nature of the proposed works (vegetation management) would not have a measureable effect on surface water, fluvial geomorphology or groundwater.

Study areas

1.12.2 The study areas for surface water, fluvial geomorphology and groundwater only comprise the area within the site boundaries (i.e. the Order Limits). In the absence of detailed baseline data for the sites and for land extending beyond the site boundaries, and due to the limited activities at the sites the study areas have not been extended further. The exceptions to the defined study areas are the designated sites adjacent to the sites, as follows:

- The Corsydd Mon SAC and the Caeau Talwrn SSSI within and to the south of Cae Canol-dydd; and
- The Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) to the northeast and the Caeau Talwrn SSSI to the southwest of Cors Gwawr.

1.12.3 Two areas of land over 500m and 1km to the north of Cae Canol-dydd are also part of the Caeau Talwrn SSSI and Corsydd Mon SAC; however, these are located upstream of Cae Canol-dydd and have therefore been scoped out of further assessment.

Baseline environment

1.12.4 The baseline details below have been derived from online sources and from multiple site walkovers undertaken between September and November 2016 with a further visit in July 2017. In addition to the site walkovers, a consistent source of information has been Ordnance Survey mapping [RD28]. Other specific sources are referenced where relevant.

Surface Water

Catchment and water features

Cae Canol-dydd

1.12.5 The primary watercourse within the Cae Canol-dydd study area is the Afon Canol-dydd. The Afon Canol-dydd flows southwest through the study area. It is an ordinary watercourse within the northern extent of the study area and becomes a main river downstream of the confluence of the eastern tributary (towards the southern extent of the study area). The planform of the watercourse has been straightened around the electricity pylon located within the north of the study area.

1.12.6 The Afon Canol-dydd is fed by a number of smaller drainage ditches, which drain the surrounding valley slopes.

1.12.7 The Afon Canol-dydd is assessed as having a high value as a surface water receptor as it directly feeds the Caeau Talwrn SSSI and Corsydd Mon SAC. The drainage ditches are assigned a low value for surface water based on the low environmental importance of these water features and the limited flows and volumes stored or conveyed.

Cors Gwawr

1.12.8 The primary watercourse within the study area is an unnamed ordinary watercourse which flows northeast through the centre of the study area, confined on both the northwest and southeast sides by steeper sloping valley sides. The main inflows to the site are from direct rainfall, surface water and groundwater.

1.12.9 The watercourse is fed by a network of drainage channels that are likely to have been artificially created for drainage purposes. In the southwestern extent of the study area the channel creation is likely to have been primarily focused on draining the surrounding land for agricultural purposes.

1.12.10 The unnamed ordinary watercourse is assigned a high value for surface water as it directly feeds the Cors Bodeilio SSSI. The drainage ditches are assigned a low value for surface water. This is based on the low environmental importance of these features, the modification involved with their development, and the limited flows and volumes stored or conveyed.

Flood Risk

1.12.11 A Flood Consequences Assessment (FCA) has been undertaken for both sites and is included in annex 2. The assessment follows the requirements of TAN 15 [RD29], which focuses on the flood risks of a development post-construction, but due to the relatively short timescale of construction activities (which would not be affected by climate change), does not consider the risks during construction. These risks are therefore considered below.

Cae Canol-dydd

1.12.12 The FCA (annex 2) identifies that the northeast and southwest areas of Cae Canol-dydd are located within Flood Zone B [RD30]. According to Technical Advice Note 15 (TAN 15) [RD29], this means that there is considered to be little to no risk of fluvial or tidal flooding to the site. The central area of the site, corresponding with the Corsydd Mon SAC and the Caeau Talwrn SSSI, falls within Flood Zone A. This means that there is considered to be little to no risk of fluvial or tidal flooding to the site [RD29]. However, the size of the Afon Canol-dydd, as an ordinary watercourse within the study area, and its catchment means that it will not have been included in the modelling used to produce TAN 15's Development Advice Maps [RD30].

1.12.13 According to NRW's surface water flood map [RD31], Cae Canol-dydd is at low risk of surface water flooding, with some areas of high risk largely confined to the watercourse channels (see figure 9). The Corsydd Mon SAC and the Caeau Talwrn SSSI are located directly in the centre of this site and are shown to be at low risk of surface water flooding. The SAC and the SSSI

have been assigned as high values receptors based on their environmental designations.

1.12.14 An electricity pylon in the north of the site is in close proximity to a drainage ditch. This pylon is at low risk of surface water flooding. The pylon has been assigned a medium receptor value based on its function as utility infrastructure.

Cors Gwawr

1.12.15 The FCA (annex 2) identifies that Cors Gwawr is located within Flood Zone A [RD30], which according to Technical Advice Note 15 (TAN 15) [RD29] means that there is considered to be little to no risk of fluvial or tidal flooding to the site. However, the drainage ditches that flow through the site, which are classified as ordinary watercourses, and their small catchment area means that they will not have been included in the modelling used to produce the TAN 15 Development Advice Maps [RD30].

1.12.16 According to NRW the surface water flood map [RD31], Cors Gwawr is largely at low risk of surface water flooding, with a pocket of land in the northeast of the site at high risk of surface water flooding (see figure 10).

1.12.17 The Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) located downstream of the site is also shown to be largely at high risk of surface water flooding across the southwest part of the site. The SAC and SSSI have been assigned high value receptors based on their environmental designations. The Caeau Talwrn SSSI is located upstream of the site but is only separated from the site by a local single carriageway road. The SSSI is therefore scoped in for further assessment and has been assigned a high value receptor based on its environmental designation.

Surface water quality

1.12.18 Surface water monitoring was undertaken in November 2016, March 2017 and July 2017, including *in situ* readings and sampling for laboratory analysis. A summary of the chemical composition of the surface water samples is presented in table 1-17 and table 1-18.

Cae Canol-dydd

1.12.19 The pH of the surface water samples was broadly neutral (pH 7-8) and alkalinity levels and calcium concentrations were high, which suggest leaching from calcareous soils.

Table 1-17 Summary of Water Quality Results at Cae Canol-dydd

Determinand	Units	No. of samples	Mean	Min	Max
In situ water monitoring					
pH	pH	18	7.5	6.3	8.4
Electrical conductivity	µS/cm	18	501	334	637
Dissolved oxygen	%	16	114	57	190
Redox potential	V	17	326	15	594
Turbidity	NTU	5			
Laboratory analysis – inorganics					

Determinand	Units	No. of samples	Mean	Min	Max
pH	pH	19	7.9	7.5	8.3
Electrical conductivity	µS/cm	19	520	314	665
Alkalinity (total) as CaCO3 (dissolved)	mg/l	19	276	135	355
Total Dissolved Solids	mg/l	19	350	199	430
Total Suspended Solids	mg/l	15	105	2.5	657
Laboratory analysis – metals					
Calcium (dissolved)	mg/l	19	111.73	48.6	145.0
Iron (dissolved)	mg/l	19	0.17	<0.019	2.27
Magnesium (dissolved)	mg/l	19	5.96	3.87	9.44
Potassium (dissolved)	mg/l	19	2.49	<1	5.84
Sodium (dissolved)	mg/l	19	14.62	10.47	19.0

Cors Gwawr

1.12.20 The pH of the surface water samples was neutral to slightly alkaline (maximum of 8.3 which was in 2016), due to calcium and bicarbonate concentrations being high.

1.12.21 These high concentrations are likely due to leaching from the soil, or possibly from the limestone bedrock depending on the thickness and permeability of the till.

Table 1-18 Summary of water quality results at Cors Gwawr

Determinand	Units	No. of samples	Mean	Min	Max
In situ water monitoring					
pH	pH	23	7.5	5.5	8.3
Electrical conductivity	µS/cm	23	499	338	704
Dissolved oxygen	%	18	88	11	118
Redox potential	V	23	106	-113	400
Turbidity	NTU	8	146	5	500
Laboratory analysis – inorganics					
pH	pH	23	7.7	7.0	8.1
Electrical conductivity	µS/cm	23	533	416	623
Alkalinity (total) as CaCO3 (dissolved)	mg/l	23	285	230	360
Total Dissolved Solids	mg/l	21	339	72	429
Total Suspended Solids	mg/l	23	658	4	4080
Laboratory analysis – metals					
Calcium (dissolved)	mg/l	26	115.23	90.5	137.0
Iron (dissolved)	mg/l	26	0.58	<0.019	9.79
Magnesium (dissolved)	mg/l	26	4.48	2.96	6.0
Potassium (dissolved)	mg/l	26	2.25	<1	6.21
Sodium (dissolved)	mg/l	26	13.36	8.90	17.0

Surface water abstractions and discharges

1.12.22 Surface water can be abstracted from watercourses for a variety of uses including potable supply, agriculture (for watering crops or as a water supply for animals) or industrial uses. Anglesey was a licence-exempt area until January 2018 and so NRW does not hold any records of abstractions from surface water. There is unlikely to be any use of the watercourses for potable abstraction given their small size and intermittent nature. It is likely that some watercourses would be used for riparian purposes.

1.12.23 There are no known industrial water discharges within the study area, but there could be agricultural water discharges present.

Fluvial Geomorphology

Cae Canol-dydd

1.12.24 The Afon Canol-dydd has its source from a spring at the northern extent of the study area. The watercourse is fed by three small straight drains and one larger tributary. The larger tributary, located to the north of Canol-dydd Farm, has an undefined channel in the upstream extent and is then dammed to form a small pond at the eastern extent of the study area. From here the channel passes over a small drop and flows towards the Afon Canol-dydd in a trapezoidal channel.

1.12.25 The following baseline has been developed from observations made from a series of photographs taken during an ecological walkover survey in 2017. In the northern extent of the study area the Afon Canol-dydd has an undefined channel, with flows typically spreading through the open fen habitat. As the channel moves southwest the channel becomes more defined. To the west of Canol-dydd Farm the channel width measures approximately 1-1.5m. The channel appears to be incised, with vertical banks. The bank tops are vegetated with hedgerows and grasses, with some scattered trees which are likely to provide stability to the channel banks as a result of the root network. Limited geomorphological features can be observed within the channel from the site photographs.

1.12.26 For fluvial geomorphology, all receptors within the study area are considered to have a low value.

Cors Gwawr

1.12.27 The watercourses within the study area are typically straight and form the boundary of agricultural fields.

1.12.28 The following baseline has been developed from observations made from a series of photographs taken during an ecological walkover survey in 2017. The primary watercourse within the study area has a wider channel cross-section, with in-channel macrophytes covering the majority of the channel bed. The bed, where visible, appears to consist of silt with some finer gravels; however, the extent of the gravels is unknown. The bank tops are vegetated with tall grasses. Limited geomorphological features can be seen in the channel from the photographs provided.

1.12.29 The drainage channels within the study area appear to have uniform cross-sections with vertical bank faces. The bed of the channels is typically obscured by leaf detritus in the photographs, with the banks consisting of earth. The drainage channels typically have limited geomorphological features with ponded water and no observable flow. Some of the channels can be seen to be less defined, with bankfull widths of less than 0.2-0.3m. The vegetation along the bank tops primarily consists of grasses, with some scattered trees likely providing some stability to the banks.

1.12.30 For fluvial geomorphology, all receptors within the study area are considered to have a low value.

Groundwater

Soils, geology and aquifer characteristics

1.12.31 A detailed description of the soils and geology is included in section 1.12. Only elements pertinent to the groundwater assessment are included below.

Cae Canol-dydd

1.12.32 The bedrock beneath the majority of the site comprises Ligwy Sandstone Formation with the bedrock to the east comprising Clwyd Limestone Group. The south comprises sandstone and conglomerate interbedded.

1.12.33 A layer of glacial till covers the bedrock across the majority of the site, with the exception of the far east of the site where there is no drift cover. Alluvium overlays the till in the west, along the route of the ordinary watercourse. Where the till has a clay matrix it will have a low permeability and limited significance for groundwater supply or river base flow. Given that Cae Canol-dydd was likely to have previously been fen and drained by installing drainage ditches, this suggests that the soil and till underlying the site is clayey in nature and of relatively low permeability.

1.12.34 Recharge through till is likely to be very low where it is clayey in nature. Shallow ground investigations to date have found that the site is underlain by mineral soils. Across most of the site, a horizon of white sandy soil and limestone gravel clasts was found at depths between 0.2m and 1.2m below clay. In the far south of the site, silty clay soil was encountered.

Cors Gwawr

1.12.35 The bedrock underlying the majority of the site comprises the Clwyd Limestone Group with interbedded sandstone with the east of the site being underlain by schist, quartzite and pillow lavas.

1.12.36 Coring showed that peat was present in the west of the site, approximately 30m east of Caeau Talwrn SSSI. The core at this location reached a depth of 0.6m and comprised 0.5m of gleyed, clay mineral soil, overlying a 0.05m layer of peat, which itself then overlays a 0.05m layer of white/grey sand, containing gravel clasts. The peat was found to be relatively well decomposed, with low moisture content. Peat is present across the site, forming a 0.2m topsoil layer at boring locations across the site.

1.12.37 A layer of glacial till covers the whole of the site, with alluvium overlaying the till in the north. The thickness of the till is unknown. The till generally has a low permeability and limited significance for groundwater supply or river base flow. Recharge through till is likely to be very low.

Cae Canol-dydd and Cors Gwawr

1.12.38 The glacial till is a Secondary (Undifferentiated) aquifer whilst the alluvium is an unproductive stratum. The bedrock is a locally important aquifer that can be used for water supply, although flow through the limestone strata will be dominated by flow through discontinuities and so will be very variable between locations.

Groundwater quality

1.12.39 According to NRW [RD32], the Ynys Môn Secondary WFD groundwater body as a whole is currently achieving poor quality status. The quality status is likely to be spatially very variable across the WFD water body and the areas of poor quality could be due to the presence of nitrates or localised pollution associated with historical mining activities at Parys Mountain which is located site south of Amlwch town approximately 10km southeast of Cae Canol-dydd and Cae Gwawr.

1.12.40 No specific groundwater sampling was undertaken. Soil samples were collected in November 2016 and a summary of the data is presented in table 1-19 and table 1-20.

Cae Canol-dydd

1.12.41 Four soil samples were collected in November 2016 and sent for laboratory analysis. The pH of the leachate from the soil was slightly alkaline and the concentration of calcium and levels of alkalinity were high, suggesting that it contained limestone.

Table 1-19 Summary of soil sampling at Cae Canol-dydd

Determinand	Units	No. of samples	Mean*	Min	Max
pH (dissolved)	pH	4	8.1	7.9	8.3
Alkalinity (Carbonate) as CaCO3 (dissolved)	mg/l	4	26	<2	40
Alkalinity (Bicarbonate) as CaCO3 (dissolved)	mg/l	4	225	140	320
Calcium (dissolved)	mg/l	4	108.9	66.4	163.0
Magnesium (dissolved)	mg/l	4	4.9	1.8	7.7
Potassium (dissolved)	mg/l	4	1	<1	1

* mean value recorded, with less than detection values conservatively averaged as the level of detection.

Cors Gwawr

1.12.42 No specific groundwater sampling was undertaken. Four soil samples were collected in November 2016. The pH of the leachate from the soil samples was slightly alkaline (pH 7.9–8.3) and calcium concentrations and

bicarbonate concentrations were relatively high which is not unusual for an area underlain by limestone.

Table 1-20 Summary of soil sampling at Cors Gwawr

Determinand	Units	No. of samples	Mean*	Min	Max
pH (dissolved)	pH	4	8.3	8.2	8.4
Alkalinity (Carbonate) as CaCO3 (dissolved)	mg/l	4	32.5	20	50
Alkalinity (Bicarbonate) as CaCO3 (dissolved)	mg/l	4	206.25	170	230
Calcium (dissolved)	mg/l	4	99.13	70.5	112
Magnesium (dissolved)	mg/l	4	3.05	1.86	4.79
Potassium (dissolved)	mg/l	4	1	<1	1

* mean value recorded, with less than detection values conservatively averaged as the level of detection.

Groundwater flow and levels

1.12.43 Given the absence of groundwater-monitoring boreholes in the area, there is no groundwater level or flow data available for this assessment. The geology and hydrology indicate that there is unlikely to be a substantial groundwater resource associated with the superficial deposits. Most incident rainfall will infiltrate the organic topsoil and become runoff once the infiltration capacity of the soil has been exceeded, or become shallow through flow to local streams and ditches.

1.12.44 The general groundwater flow direction in the bedrock, at the regional scale, is likely to be towards the coast. Groundwater from bedrock supports both watercourses and drains within both sites.

1.12.45 There are multiple groundwater springs located within the site boundaries of Cae Canol-dydd and Cors Gwawr. These springs are understood to feed the watercourses located on the sites. The value of this receptor is assessed as low for the groundwater assessment.

Groundwater abstractions

Cae Canol-dydd

1.12.46 OS mapping shows a well located within the southeast of the site, adjacent to Canol-dydd Farm (ruins), although this could not be found on site. It is not known if water is abstracted from this well or if this could influence stream flow through the site. In line with the assessment criteria in chapter B8 (surface water and groundwater) (Application Reference Number: 6.2.8), the value of this receptor is assessed as low for the groundwater assessment.

Cors Gwawr

1.12.47 There are two wells within the study area. It is not known if water is abstracted from these wells or whether this could influence stream flow through the site; however, any abstraction is likely to be for agricultural purposes only. In line with the assessment criteria in chapter B8 (Application

Reference Number: 6.2.8), the value of this receptor is assessed as low for the groundwater assessment.

Groundwater-dependent terrestrial ecosystems

1.12.48 It is known that the current compensation sites will increase connectivity between the following ecologically designated sites:

- Corsydd Mon SAC;
- Caeau Talwrn SSSI; and
- Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC).

1.12.49 Corsydd Mon comprises a series of fen basins located on the limestone of eastern Anglesey. It contains areas of flush mire where calcareous springs irrigate the surface.

1.12.50 The heterogeneous nature of the drift and topography together with the local occurrence of base-rich springs and seepage lines has given rise to a complex mosaic of vegetation types varying with the impedance of the drainage across Caeau Talwrn SSSI.

1.12.51 Cors Bodeilio is a nationally important calcareous mire situated in a shallow valley between Pentraeth and Llangefni. The mire is supplied with base-rich water from the surrounding Carboniferous Limestone which has promoted the development of a range of rich-fen vegetation communities that now overlie a body of fen peat.

Water Framework Directive

Cae Canol-dydd

1.12.52 The watercourses within the study area form part of the Cefni – Ceint to Cefni reservoir WFD water body (GB110102058770) [RD32]. The WFD water body is currently achieving moderate overall status with the objective of achieving 'good' by 2027.

1.12.53 The groundwater forms part of the Ynys Môn Central Carboniferous Limestone (GB41001G204200) [RD4]. The overall status of this water body is poor due to poor chemical quality.

Cors Gwawr

1.12.54 The watercourses within the study form part of the Anglesey North Coastal Water Framework Directive (WFD) water body (GB641010620000) [RD32]. The WFD water body is currently achieving moderate status with the objective of achieving 'good' by 2027.

1.12.55 The groundwater beneath the southern part of Cors Gwawr forms part of the Ynys Môn Central Carboniferous Limestone (GB41001G204200) waterbody, whilst that beneath the southern part of the site forms part of the Ynys Môn Secondary [RD32]. The overall status of both water bodies is poor due to poor chemical quality.

Summary of receptors

1.12.56 Surface water and groundwater receptors that have been identified and that could potentially be affected by the SSSI compensation sites are listed in table 1-21.

Table 1-21 Summary of water environment receptors

Category	Study area	Key receptors	Value[11]
Surface water	Cae Canol-dydd	Afon Canol-dydd on site	High
		Drainage ditches on site	Low
		Flood risk to Cae Canol-dydd	Medium
		Flood risk to Corsydd Mon SAC and Caeau Talwrn SSSI on site	High
		Flood risk to electricity pylon on site	Medium
	Cors Gwawr	Unnamed ordinary watercourse on site	High
		Drainage ditches on site	Low
		Flood risk to Cors Gwawr	Medium
		Flood risk to small farm holding on site	High
		Flood risk Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) immediately downstream	High
Fluvial Geomorphology	Cae Canol-dydd	Afon Canol-dydd	Low
		Drainage ditches	Low
	Cors Gwawr	Unnamed ordinary watercourse	Low
		Drainage ditches	Low
Groundwater	Cae Canol-dydd and Cors Gwawr	Wells and springs	Low
		Superficial Aquifer	Low
		Bedrock aquifers	Medium

Evolution of the baseline

1.12.57 Over a medium to long-term period, climate change could potentially alter the hydrological regime of the watercourses. This is assessed as part of the surface water baseline. Increased frequency/severity of droughts and floods could potentially lead to the watercourses adjusting to different patterns of erosion and deposition. However, it is likely that the adjustment would remain localised and of relatively low magnitude given the channel types.

[11] Basis of value is defined in table B8-10 in chapter B8 (Application Reference Number: 6.2.8).

Unless there are new groundwater abstractions in the area the groundwater baseline is unlikely to change significantly.

Design basis and activities

1.12.58 This section sets out the design basis for this assessment of effects and is based on the description of the proposed development in section 1.2 and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). 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. A worst-case scenario has been assessed from a surface water and groundwater perspective based on the description of the proposed development and the assumptions and mitigation outlined below.

1.12.59 The compensation proposals at both sites are summarised in section 1.2 of this report. In summary, they comprise habitat creation, habitat enhancement and habitat management. General work activities of relevance to the surface water and groundwater assessment include the following:

- topsoil stripping;
- creation topsoil storage mounds (for up to 3 years), with subsequent removal for reuse off-site;
- dam (likely to comprise simple plank weirs or similar) installation across surface water drainage channels to retain water;
- removal, or diversion, of local surface water drainage channels;
- removal of buried field drains or blocking their outflows;
- localised changes to the topography to retain water;
- diversions of calcareous spring flows across the site; and
- fencing and seeding.

1.12.60 The stripping of topsoil would take place during periods where practicable (see section 1.2) to reduce the potential impact of sediment-laden runoff during winter storms affecting watercourses and designated sites.

1.12.61 Good practice mitigation during construction and operation would comprise adherence to all relevant legislation, statutory and non-statutory guidance as detailed in chapter B8 (Application Reference Number: 6.2.8) and as stated in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

1.12.62 The Wylfa Newydd CoCP (Application Reference Number: 8.6) details good practice procedures that the Contractor would be required to follow. The implementation of this mitigation would be the responsibility of the Contractor, with no work being commenced before all contractors are familiar with the Wylfa Newydd CoCP (Application Reference Number: 8.6). This would include management of materials; management of drainage and sediment; and emergency response procedures. The processes for checking and reporting compliance would be detailed, as would the process

for changes if significant pollution of the water environment were to be identified.

Assessment of effects

1.12.63 This section presents the findings of the assessment of effects associated with the construction and operation of the proposed ecological compensation sites. The methodology used for the assessment, including the basis of the values ascribed, is detailed in section 8.4 of chapter B8 (Application Reference Number: 6.2.8).

Construction

Surface water

Cae Canol-dydd and Cors Gwawr

1.12.64 The construction of the Ecological Compensation Sites would require various earthworks to take place which may affect the network of drainage ditches. There is the potential for the mobilisation of fine sediment during excavation, from the topsoil stripping, storage mounds and as a result of the bare earth surfaces. Topsoil stripping is being proposed to be completed in phases across two years. This reduces the amount of bare soil exposed at any one time which could in turn reduce the amount of suspended sediment which could be entrained at the time of construction.

1.12.65 Through the application of this phased construction, along with sediment management procedures detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6), including the use of silt fences, drainage systems and sediment settlement lagoons (with treatment if necessary) the potential magnitude of change would be negligible to small. The surface water receptor values range from low to high with a resulting significance of effect between negligible and minor adverse. These are not significant effects.

1.12.66 There is also the potential for degradation of surface water quality due to spillages and leaks of fuels and oils from construction plant. Management activities detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6), including appropriate storage of oils and fuels, controls on refuelling, plant maintenance and provision of spill kits would mitigate these potential effects, with the potential magnitude of change considered to be negligible. Combined with receptors of low to high value, these result in negligible effects. These are not significant effects.

Flood risk

Cae Canol-dydd and Cors Gwawr

1.12.67 Given that the purpose of the Ecological Compensation Sites is to create, enhance and manage habitat, an adaptive management approach would be followed such that there would be no detrimental change to flood risk to the Corsydd Mon SAC or the Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC). This would mean that if changes to the drainage could have the potential to result in increased flooding to the downstream

ecologically sensitive areas, then the drainage modifications would be altered to avoid this. The flood risk to the high value SSSI and SAC is therefore assessed to be negligible, which is not a significant effect.

1.12.68 The FCA undertaken for the sites (annex 2 of this appendix) follows the requirements of TAN 15 [RD29], which focuses on the flood risks of a development post-construction. However, due to the relatively short timescale of construction activities (which would not be affected by climate change), the FCA does not consider the risks during construction. Flood risks during construction are therefore considered below.

1.12.69 During construction there is the potential that changes to landforms, surface compaction and vegetation cover could increase the volume and rate of surface water runoff. At Cae Canol-dydd this could increase the flood risk to the electricity pylon on site and the Corsydd Mon SAC and SSSI on site. At Cors Gwawr, changes to landforms, surface compaction and vegetation cover could increase the flood risk to the small farm holding on site and the Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) immediately downstream of the site.

1.12.70 The flood risk to the medium value electricity pylon is considered to be negligible as the base structure is set in concrete foundations and the cables are set at a considerable distance above any flood level. The flood risk to the high value small farm holding is considered to be negligible as it is located on a topographic high point on site. These are not significant effects.

1.12.71 In addition, the phased removal of topsoil and the use of a sediment settlement pond (which would also act to attenuate flows), would act to mitigate any effects on flood risk. Furthermore, contractors would adhere to flood risk management procedures outlined in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Fluvial geomorphology

Cae Canol-dydd and Cors Gwawr

1.12.72 The construction of the Ecological Compensation Sites would require the stripping of topsoil across the study areas and storage within the site boundaries. There is the potential for mobilisation of fine sediment during the works, from the storage mounds and as a result of the bare earth surfaces until vegetation becomes established. The potential effects would be managed through drainage and sediment control as detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6). The potential magnitude of change is considered to be small. Combined with a low receptor value for all watercourses, this results in a minor adverse effect. This is not a significant effect.

1.12.73 In-channel working would be required on the larger tributary for the channel realignment/diversion works. The in-channel working would lead to the removal and disturbance of the channel bed and banks, as well as removing riparian vegetation. The potential effects would be managed through application of appropriate guidance and a risk assessment as detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6). The magnitude

of change is considered to be small. Due to the low value of the receptor this would result in a minor adverse effect on the larger tributary. This is not a significant effect.

1.12.74 In-channel working would also be required along the Afon Canol-dydd to install the proposed dams to retain water on site, altering the channel bed and banks. Works would also be required along the bank tops for the two access bridges. These works would be temporary and include small scale operations such as use of simple wooden planks for dams. They may lead to the small scale removal of the surrounding riparian vegetation, potentially destabilising the banks. The potential effects would be managed through application of appropriate guidance and a risk assessment as detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6). The magnitude of change is considered to be small. Combined with the low-value receptor, this would result in a minor adverse effect during construction on the Afon Canol-dydd. This is not a significant effect.

Groundwater

Cae Canol-dydd and Cors Gwawr

1.12.75 Changes in groundwater quality could occur due to leaks and/or spills of fuels or other polluting materials used in plant for construction activities. In the event of a leak or spill, potential contamination could migrate into the superficial and/or bedrock aquifers and affect groundwater quality, although if clayey the superficial deposits would limit contaminant migration into the underlying bedrock. With the implementation of the mitigation measures detailed in the Wylfa Newydd CoCP (Application Reference Number: 8.6), including appropriate storage of oils and fuels, controls on refuelling, plant maintenance and provision of spill kits, the magnitude of change to groundwater receptors would be negligible and, based on the value of the receptors detailed in table 1-21, the effects on these would also be negligible. This is not a significant effect.

1.12.76 Increased impermeable areas created during the construction period, including construction compounds and compacted ground caused by plant and machinery, could reduce rainwater reaching groundwater, potentially altering local recharge rates and resource availability for groundwater levels and groundwater flow directions. The proposed works are to take place largely above ground level and would have very little interaction with the groundwater, therefore the springs and wells would not be directly affected. Furthermore, the impermeable areas created during construction would only be temporary and would only form a very small proportion of the groundwater catchments. The magnitude of change to the groundwater receptors is therefore considered to be negligible so the effect on these receptors would also be negligible. This is not a significant effect.

Operation

Surface water

Cae Canol-dydd and Cors Gwawr

1.12.77 Once the two sites are revegetated there would be no adverse effect on water quality, and potentially there could be a beneficial effect as there would be no further nutrients added to the soil and so leaching of nutrients to the watercourses would be reduced. Although the topsoil would be stored on site, it would be in vegetated mounds and the potential for leaching any nutrients from these would be reduced by the vegetation on the mounds and slopes to encourage runoff. The changes to water quality are likely to be negligible or potentially small in a positive manner. This would result in a negligible or minor beneficial effect on the surface water receptors which have a value ranging from low to high. These are not significant effects.

Flood risk

Cae Canol-dydd and Cors Gwawr

1.12.78 The proposed SSSI compensation scheme is designed to increase water retention at the sites. Therefore, whilst this would increase the risk of flooding to the sites, this would be a beneficial effect. The magnitude of change is considered to be high, based on a long-term aim to increase saturation levels on the site. Although normally considered an adverse effect, for these sites it would be positive, provided that the flooding was not too extensive or for too long a duration. The nature and extent of flooding would be monitored as part of the adaptive management approach and changes made as necessary. The increase in flooding at these medium value sites would likely be small to medium magnitude and which would result in a minor to moderate beneficial effect. The former is not significant, whilst the latter is, although it is beneficial rather than adverse.

1.12.79 The high value Corsydd Mon SAC and SSSI is downstream of Cae Canol-dydd, whilst Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) is downstream of Cors Gwawr. As the proposed scheme would retain water on the sites, there would be no increase in flood risk to these. There could, however, be a potential for Cors Bodeilio to become drier during the summer, should high temperatures combine with greater retention of water on Cors Gwawr relative to the baseline. This would be managed through ongoing monitoring and adaptive management. The magnitude of effect is considered to be negligible to small, with the significance of effect being minor adverse. This is not a significant effect.

1.12.80 As per the effects during construction, there would be a negligible magnitude of change, and effect, in flood risk to the electricity pylon and the small farm holding as both are sited at higher topographic levels than the watercourses. This is not a significant effect.

Fluvial geomorphology

Cae Canol-dydd

1.12.81 As a result of the new dam structures (likely to be simple plank weirs) and two new bridge crossings, the functioning of the Afon Canol-dydd within the study area would fundamentally change. The dam structures would lead to the removal of the natural bed and bank material and locally act as a barrier to flow and sediment processes. The bridges would also remove riparian vegetation, alter lateral connectivity with the floodplain and lead to a length of bank being reinforced with artificial material. The runoff to the Afon Canol-dydd would also be altered as a result of excavation of the surrounding land and modifications to the larger tributary.

1.12.82 The watercourse has been determined to have limited morphological features and diversity. The presence of some areas of existing fen habitat also suggests that this could have been more extensive historically. The proposals would therefore improve the lateral connectivity locally around the dam structures and re-create the fen habitat. The magnitude of impact on the Afon Canol-dydd as a result of the dam structure, bridges and changes in catchment functioning is considered to be medium. Combined with the low-value receptor this would result in a minor adverse effect. This is not a significant effect.

1.12.83 The permanent diversion/realignment of the larger tributary to the east of the Afon Canol-dydd would lead to the channel being lengthened, resulting in a change in the channel gradient. This could lead to changes in channel connectivity and flow and sediment processes. As the channel has limited morphological features and the length of the realignment would be limited, the magnitude of impact is considered to be small. Combined with the low-value receptor, this would result in a minor adverse effect. This is not a significant effect.

1.12.84 The proposals for Cae Canol-dydd are not considered to have an effect at a WFD water body scale or prevent the Cefni – Ceint to Cefni reservoir WFD water body from achieving good status.

Cors Gwawr

1.12.85 As a result of the proposed scheme, the functioning of the watercourses within the study area would fundamentally change. The dam structures (likely to be simple plank weirs) on the watercourses would lead to the removal of the natural bed and bank material and locally act as a barrier to flow and sediment processes; although the channels typically have limited geomorphological features. The runoff to the channels would also be altered as a result of excavation. However, the presence of some areas of existing fen habitat does suggest that this could have been more extensive historically. The works would therefore re-create more naturalised processes by reinstating this habitat, and improve lateral connectivity with the floodplain.

1.12.86 The permanent diversion/realignment of some of the drainage channels would lead to the lengthening of the channel, resulting in a lower channel gradient.

As a number of these channels currently have limited flow, it is not considered that this would have a significant effect, but would change the functioning of the channels in the long term.

1.12.87 As a result of the channel diversions/realignments, dam structures and changes to the channel functioning, the magnitude of impact for all watercourses is considered to be medium. Combined with the low-value receptor, this would result in a minor adverse effect. This is not a significant effect.

1.12.88 The proposals for Cors Gwawr are not considered to have an impact at a WFD water body scale or prevent the Anglesey North WFD water body from achieving good status. A detailed WFD compliance assessment (Application Reference Number: 8.26) is provided with the Environmental Statement.

Groundwater

Cae Canol-dydd and Cors Gwawr

1.12.89 Due to the likely low permeability of the glacial till, groundwater recharge is already limited/slow across the site, therefore the magnitude of change for both groundwater levels and quality has been assessed as negligible. Combined with the receptor values, which are low to medium, the significance of effect is considered negligible.

Additional mitigation

1.12.90 No additional mitigation is required based on the proposed development plans and the embedded and good practice mitigation.

Residual effects

1.12.91 There would be no significant residual effects on surface water and groundwater.

1.13 Terrestrial and freshwater ecology

Study areas

1.13.2 The desk study comprised the collation of Cofnod and designated sites (statutory and non-statutory) data for the area within a 2km radius from the three sites.

1.13.3 The baseline information includes data collected during ecological field surveys with specific study areas as follows.

- National Vegetation Classification (NVC) surveys have been completed within each of the site boundaries where access was permitted. Ty du was surveyed in June 2016, and Cors Gwawr and Cae Canol-dydd surveyed in July 2017.
- Terrestrial ecology surveys were undertaken at Ty du during field surveys undertaken for the A5025 northern leg between Cemaes and Burwen in 2015 and during field surveys undertaken for the A5025 between Valley and Burwen between 2011 and 2014. The 2015 study areas comprised a buffer up to 300m for GCN and 100m for bat roosts, which includes part of the Ty du site. The 2011 to 2014 study areas comprised a buffer of up to 500m for amphibians, reptiles, breeding and wintering birds (extended to 1km for barn owl (*Tyto alba*)) and riparian mammals, which includes all of Ty du; the following appendices are of relevance.
- Appendix G9-2 (A5025 Terrestrial Ecology Factual Report 2014-2016) (Application Reference Number: 6.7.23).
- Appendix G9-3 (A5025 Route Improvement Contract: Preliminary Ecological Appraisal) (Application Reference Number: 6.7.24).
- Appendix G9-4 (A5025 Route Improvement Contract EIA: Breeding Bird Survey Report) (Application Reference Number: 6.7.25).
- Appendix G9-5 (A5025 Route Improvement Contract EIA: Great Crested Newt Field Survey Results) (Application Reference Number: 6.7.26).
- Appendix G9-6 (A5025 Route Improvement Contract EIA: Hedgerow Survey Results) (Application Reference Number: 6.7.27).
- Appendix G9-7 (A5025 Route Improvement Contract EIA: Otter & Water Vole Survey Results) (Application Reference Number: 6.7.28).
- Appendix G9-8 (A5025 Route Improvement Contract EIA: Reptile Survey Results) (Application Reference Number: 6.7.29).
- Appendix G9-9 (A5025 Route Improvement Contract EIA: Winter Bird Survey Results - Winter 2013/2014) (Application Reference Number: 6.7.30).

Baseline environment

1.13.4 This section provides a summary of the baseline conditions for terrestrial ecology within the study areas described above. Receptors have been valued according to the methodology and criteria described in chapter B9 (terrestrial and freshwater ecology) (Application Reference Number: 6.2.9).

Cae Canol-dydd

Statutory and non-statutory designated sites

1.13.5 The following statutory sites were recorded within the desk study area and are shown on figure 11.

- Corsydd Môn / Anglesey Fens SAC: 465.04ha site, component parts within and immediately adjacent to the northern boundary of Cae Canol-dydd. This site also comprises Corsydd Môn a Llyn / Anglesey and Llyn Fens Ramsar. Designated for Annex I habitats and Annex II species:
- 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp;
- 7210 Calcareous fens with C*ladium mariscus* and species of the *Caricion davallianae;*
- 7230 Alkaline fens;
- 4010 Northern Atlantic wet heaths with *Erica tetralix;*
- 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*);
- 1013 Geyer`s whorl snail (*Vertigo geyeri*) (within Cors Erddreiniog and Waun Eurad SSSIs);
- 1044 Southern damselfly (*Coenagrion mercuriale*); and
- 1065 Marsh fritillary butterfly (*Euphydryas* (Eurodryas, Hypodryas) *aurinia*).
- Caeau Talwrn SSSI: 24.8ha site, partly within the site boundary of Cae Canol-dydd. This site is of special interest for its neutral grassland and mire vegetation. It includes dry neutral grasslands and various types of mire including rich-fen, fen-meadow and rush pasture, and also shows the transitions between the various types particularly well. The northern sections of this SSSI form part of Corsydd Môn / Anglesey Fens SAC.
- Cors y Farl SSSI: 12.6ha site, approximately 1km to the east. This site is one of the nationally important calcareous fens on Anglesey. It is relatively small but probably the most intact example of this habitat in north Wales. The fen has developed in a basin on the Carboniferous limestone and its development appears to have been little modified by drainage and associated activities.
- Cors Erddreiniog SSSI: 289ha site, approximately 1.51km to the north. This site is a large calcareous valley mire comprising three fen basins

interconnected by the drainage system. A Carboniferous limestone escarpment, bearing limestone grassland and a hazel woodland, lies along the eastern side of the main basin. From its foot emerge base-rich springs, which comprise an orchid-rich vegetation type, found at a few sites on Anglesey and in Lleyn, and which is not found elsewhere in Great Britain. On the ridge between the central and northwest fen basins is an acidic heathland.

- Cors Bodeilio SSSI: 54ha site, approximately 1.87km to the east. A nationally important calcareous mire situated in a shallow valley between Pentraeth and Llangefni. The mire is supplied with base-rich water from the surrounding Carboniferous limestone which has promoted the development of a range of rich-fen vegetation communities that now overlie a body of fen peat. It forms part of Corsydd Môn / Anglesey Fens SAC and also comprises Cors Bodeilio NNR.
- Gwenfro and Rhos y Gad SSSI: 43.6ha site, approximately 1.97km to the northeast. This site was selected for designation primarily as an example of a rich-fen habitat, which supports certain nationally uncommon vegetation types. It comprises two distinct wetland areas which are linked hydrologically. Both sections are supplied with base-rich water and support a range of rich-fen mire and meadow plant communities.

1.13.6 The following non-statutory designated sites have been recorded within the desk study area:

- Clegyrdy Bach/Neuadd Wen/Ty'n Beudy (I09) IACC Wildlife Site, approximately 160m to the south of Cae Canol-dydd at its closest point. This site is in two separate areas with marshy grassland, valley mire, basic flush and a small area of woodland.
- Prysan/Galchfaen/Fagwyr Fawr (J12) IACC Wildlife Site, approximately 1.18km to the north of Cae Canol-dydd at its closest point. This site comprises a mosaic of vegetation types including species-rich calcareous grassland, marshy grassland, heath, basic flush and valley mire.
- Gorchudden Gylched (I05) IACC Wildlife Site, approximately 1.23km to the southeast of Cae Canol-dydd at its closest point. This site is an area of semi-natural woodland over a small limestone hill with hawthorn (*Crataegus monogyna)*, blackthorn (*Prunus spinosa)* and gorse (*Ulex sp)* scrub and dense bracken (*Pteridium aquilinum*).
- Tir Pori Talwrn (I11) IACC Wildlife Site, approximately 1.51km to the southeast of Cae Canol-dydd at its closest point. This site comprises a mosaic of semi-improved neutral grassland, marshy grassland, basic flush and scattered scrub.

- Maen Eryr (J04) IACC Wildlife Site, approximately 1.81km to the north of Cae Canol-dydd at its closest point. This site is a floristically rich wet meadow adjacent to an area of species-rich woodland.
- Y Dingle (I04) IACC Wildlife Site, approximately 1.83km to the southwest of Cae Canol-dydd at its closest point. This site comprises an area of broad leaved woodland in the steep-sided valley of the Afon Cefni with a small area of adjoining semi-improved neutral grassland.

1.13.7 There are 16 ancient woodland sites within 2km of Cae Canol-dydd, with the closest being approximately 570m to the east.

1.13.8 In accordance with the receptor valuation criteria presented in chapter B9 (Application Reference Number: 6.2.9), the SAC and SSSI sites are of high value.

1.13.9 The IACC Wildlife Sites are considered to be of medium value.

1.13.10 Ancient woodland on Anglesey is considered to be of high value due to its restricted range and highly limited potential for substitution.

Habitats

1.13.11 Rich-fen habitat was recorded in the majority of the northern part of the site and the area that comprises Caeau Talwrn SSSI. The remainder of the site was improved pasture.

1.13.12 The rich-fen habitat supported the following characteristic rich-fen plant communities:

- M9 Carex rostrata-Calliergon cuspidatum/giganteum mire;
- M10 Carex dioica-Pinguicula vulgaris mire;
- M13 Schoenus nigricans-Juncus subnodulosus mire;
- M22 Juncus subnodulosus-Cirsium palustre fen meadow; and
- M24 Molinia caerulea-Cirsium dissectum fen meadow.

1.13.13 The site supported a suite of characteristic rich-fen vascular plant species, including dioecious sedge (*Carex dioica*); fen pondweed (*Potamogeton coloratus*); grass-of-Parnassus (*Parnassia palustris*); long-stalked yellow sedge (*Carex lepidocarpa*); and parsley water-dropwort (*Oenanthe lachenalii*). The rich-fen moss *Philonotis calcarea* was also present.

1.13.14 The improved pasture, scrub and hedgerow habitat within Cae Canol-dydd is generally common and widespread within the locality and is considered to be of low value.

1.13.15 The rich-fen habitats present within the site are nationally rare and M13 *Schoenus nigricans-Juncus subnodulosus* mire is a European priority habitat. These habitat types are therefore considered to be of high value.

Species

1.13.16 Cofnod provided records (since 2007) of the following groups and species as shown on figure 11:

- Amphibians – great crested newt (GCN) (*Triturus cristatus*);
- Reptiles – common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*);
- Breeding and wintering birds (42 species);
- Bats – six species including Whiskered/Brandt's bat (*Myotis mystacinus/brandtii*), brown long-eared bat (*Plecotus auritus*), Daubenton's (*Myotis daubentonii*) and Natterer's (*Myotis nattereri*) bat;
- Otter (Lutra lutra);
- Red squirrel (*Sciurus vulgaris*); and
- Notable mammals – brown hare (*Lepus europaeus*), hedgehog (*Erinaceus europaeus*), and polecat (*Mustela putorius*).

1.13.17 One record of GCN within the last ten years was provided by Cofnod, approximately 1.9km from the site. Due to the lack of records within or adjacent to the site itself and the type of habitat within the site it is considered likely that, if GCN were present within Cae Canol-dydd, it would be in low numbers. Based on this and its status as a legally protected species, GCN is assigned a medium value.

1.13.18 Habitat with the potential to support reptiles, including marshy grassland and scrub, is present within Cae Canol-dydd. Common lizard and slow worm are relatively common and widespread within Anglesey and are therefore assigned a low value based on the likelihood of there being low numbers present in the areas of suitable habitat, and their status as a legally protected species.

1.13.19 Cofnod returned a number of bird records from the desk study area including 42 species identified as notable under the following criteria:

- 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 [RD33];
- species listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016; and/or
- species that have associated Local Biodiversity Action Plans.

1.13.20 The habitats present within Cae Canol-dydd have the potential to support breeding and overwintering bird species, although given the bird records provided by Cofnod and the nesting, foraging and loafing habitats present on site, it is considered that Cae Canol-dydd is likely to support a range of breeding and overwintering species which are common and widespread within the area. As such, breeding and overwintering birds are assigned a low value.

1.13.21 The habitats present on site have the potential to be used by bat species for commuting and foraging. Mature trees present on site also have the potential to support roosting bats. There is substantial habitat surrounding the site

that is suitable for use by foraging, commuting and roosting bats. Given the size of the site and the habitats present, it is considered that low numbers of bats could be using the habitats within Cae Canol-dydd for foraging, commuting and roosting. Due to their legal protection status and their predicted low population size their value is considered to be medium.

1.13.22 Otter are afforded limited foraging, commuting and resting opportunities from the main ditch present within Cae Canol-dydd. Otter are relatively widespread on Anglesey and therefore may be active within the wider catchment. Given the quality of the habitat present to support otter, and their protected status, otter are considered to be of medium value.

1.13.23 Within Cae Canol-dydd there is limited habitat with the potential to support red squirrel, i.e. mature trees and scrub, although it does connect into the wider landscape. Given the quality of the habitat present, its connectivity to other areas of habitat, and their protected status, red squirrels are considered to be of medium value.

1.13.24 Cae Canol-dydd comprises habitats suitable to support notable mammals. Given their protected status and widespread distribution within Anglesey, this receptor is considered to be of low value.

Cors Gwawr

Statutory and non-statutory designated sites

1.13.25 The following statutory sites were recorded within the desk study area, and are shown on figure 12.

- Corsydd Môn / Anglesey Fens SAC: 465.04ha site, immediately adjacent to the northern boundary of Cors Gwawr. See paragraph 1.13.5 for site description.
- Cors Bodeilio SSSI: 54ha site, immediately adjacent to the north of Cors Gwawr. See paragraph 1.13.5 for site description.
- Caeau Talwrn SSSI: 24.8ha site, approximately 10m to the south. See paragraph 1.13.5 for site description.
- Cors y Farl SSSI: 12.6ha site, approximately 680m to the north. See paragraph 1.13.5 for site description.
- Gwenfro and Rhos y Gad SSSI: 43.6ha site 1.78km to the northeast. See paragraph 1.13.5 for site description.

1.13.26 The following non-statutory designated sites have been recorded within the desk study area.

- Tir Pori Talwrn (I11) IACC Wildlife Site, approximately 10m to the southwest of Cors Gwawr at its closest point. See paragraph 1.13.6 for site description.
- Gorchudden Gylched (I05) IACC Wildlife Site, approximately 960m to the southwest of Cors Gwawr at its closest point. See paragraph 1.13.6 for site description.

- Clegyrdy Bach/Neuadd Wen/Ty'n Beudy (I09) IACC Wildlife Site, approximately 1.32km to the northwest of Cors Gwawr at its closest point. See paragraph 1.13.6 for site description.
- Coed Ty Fry (M04) IACC Wildlife Site, approximately 1.61km east of Cors Gwawr at its closest point. This site comprises a small area of broad leaved woodland on a rocky limestone outcrop and adjacent damp area.

1.13.27 There are 17 ancient woodland sites within 2km of Cors Gwawr, with the closest being approximately 240m to the southeast.

1.13.28 In accordance with the receptor valuation criteria presented in chapter B9 (Application Reference Number: 6.2.9), the SAC and SSSI sites are of high value.

1.13.29 The IACC Wildlife Sites are considered to be of medium value.

1.13.30 Ancient woodland on Anglesey is considered to be of high value due to its restricted range and highly limited potential for substitution.

Habitats

1.13.31 Cors Gwawr comprised improved pasture and marshy grassland, with areas of semi-natural fen and mire vegetation. Two springs, a number of drainage ditches and small areas of scrub and defunct hedgerows/lines of trees were also present within and on the boundaries of the site.

1.13.32 The northern part of Cors Gwawr was improved pasture and much of the southern part retained semi-natural fen vegetation. The latter appeared to have been damaged in places due to drainage operations.

1.13.33 The rich-fen habitat within Cors Gwawr supported the following characteristic rich-fen plant communities:

- M13 Schoenus nigricans-Juncus subnodulosus mire;
- M22 Juncus subnodulosus-Cirsium palustre fen meadow; and
- M24 Molinia caerulea-Cirsium dissectum fen meadow.

1.13.34 The NVC survey recorded characteristic rich-fen habitat vascular plant species, including dioecious sedge; fen fragrant orchid (*Gymnadenia densiflora*); fen pondweed; grass-of-Parnassus; greater spearwort (*Ranunculus lingua*); long-stalked yellow sedge; marsh helleborine (*Epipactis palustris*); parsley water-dropwort; and great fen-sedge (*Cladium mariscus*).

1.13.35 The improved pasture, marshy grassland and hedgerow habitat is generally common and widespread within the locality and is considered to be of low value.

1.13.36 The rich-fen habitats present within the site are nationally rare and M13 *Schoenus nigricans-Juncus subnodulosus* mire is a European priority habitat. These habitat types are therefore considered to be of high value.

Species

1.13.37 Cofnod provided records (since 2007) of the following groups and species as shown on figure 12.

- Amphibians: GCN, common toad (*Bufo bufo*) and common frog (*Rana temporaria*).
- Reptiles: common lizard and adder (*Vipera berus*).
- Breeding and wintering birds (53 species).
- Bats: nine species including Whiskered/Brandt's bat, lesser horseshoe bat (*Rhinolophus hipposideros*), brown long-eared bat and noctule (*Nyctalus noctula*).
- Otter.
- Water vole (Arvicola amphibious);
- Red squirrel.
- Notable mammals: brown hare, hedgehog and polecat.

1.13.38 One record of GCN within the last ten years was provided by Cofnod approximately 2km from the site. Due to the lack of records within or adjacent to the site itself and the type of habitat within the site it is considered likely that, if GCN were present within Cors Gwawr, it would be in low numbers. Based on this and its status as a legally protected species, GCN is assigned a medium value.

1.13.39 The habitats present within Cors Gwawr offer limited potential to support adder and common lizard. Given this and their protected status, reptiles are assigned a low value.

1.13.40 Cofnod returned 53 notable bird species records from the desk study area. The habitats present within Cors Gwawr have the potential to support breeding and overwintering bird species, although given the bird records provided by Cofnod and the nesting, foraging and loafing habitats present on site, it is considered that Cors Gwawr is likely to support a range of breeding and overwintering species which are common and widespread within the area. As such, breeding and overwintering birds are assigned a low value.

1.13.41 The habitats present on site have the potential to be used by bat species for commuting and foraging. Mature trees present on site also have the potential to support roosting bats. There is substantial habitat surrounding the site that is suitable for use by foraging, commuting and roosting bats. Given the size of the site and the habitats present, it is considered that low numbers of bats could be using the habitats within Cors Gwawr for foraging, commuting and roosting. Due to their legal protection status and their predicted low population size their value is considered to be medium.

1.13.42 The main watercourse present within Cors Gwawr (Afon Nodwydd) is likely to provide limited foraging, commuting and resting opportunities for otter. Otter are relatively widespread on Anglesey and therefore may be active within the wider catchment. Given the quality of the habitat present to support otter, and their protected status, otter are considered to be of medium value.

1.13.43 The Afon Nodwydd has the potential to support water vole. Given the quality of the habitat present and their protected status, the value of the water vole populations within Cors Gwawr is considered to be medium.

1.13.44 Within Cors Gwawr there is limited habitat with the potential to support red squirrel, i.e. mature trees and scrub, although the site does connect into the wider landscape. Given the quality of the habitat present, its connectivity to other areas of habitat, and their protected status, red squirrels are considered to be of medium value.

1.13.45 Cors Gwawr comprises habitats suitable to support notable mammals. Given their protected status and widespread distribution within Anglesey, this receptor is considered to be of low value.

Ty du

Statutory and non-statutory designated sites

1.13.46 No statutory sites designated for their nature conservation interest were recorded within the desk study area.

1.13.47 The following non-statutory designated sites have been recorded within the desk study area as shown on figure 13.

- Tir Lleidiog Ty du (G10) IACC Wildlife Site. The majority of this site is within the boundary of Ty du. This site comprises a basin mire with areas of marshy grassland, raised bog and dense willow carr.
- Arfordir Trwyn y Buarth – Porth Wen (G08) IACC Wildlife Site, approximately 350m to the north of Ty du at its closest point. This site is made up of coastal cliff grassland, heathland with several species-rich flushes and large stands of bracken.
- Tir Lleidiog Llanlleiana (G09) IACC Wildlife Site, approximately 550m to the northwest of Ty du at its closest point. This site is a valley mire consisting of two main habitats; a wet fen meadow at the western end and an extensive reed bed to the east.
- Tir Gwlyb Teilia Neuadd (G07) IACC Wildlife Site, approximately 700m west of Ty du at its closest point. This site comprises a base rich valley mire surrounded by herb-rich wet meadows, with a few small areas of willow carr.
- Arfordir Porth Wen – Porth Llechog (K01) IACC Wildlife Site, approximately 1.05km northeast of Ty du at its closest point. This site comprises a narrow strip of sea cliff, grassland and heath above areas of bare rock sloping down to sheer cliffs.
- Cors Cae Owen (G06) IACC Wildlife Site, approximately 1.14km northwest of Ty du at its closest point. The site comprises a small herb-rich fen in a basin between scrub-covered outcrops and a species-rich wet meadow.

- Afon Wygyr (G05) IACC Wildlife Site, approximately 1.95km southwest of Ty du at its closest point. The site comprises a small river with species rich bank-side vegetation, marshy grassland and small woodlands.

1.13.48 In accordance with the receptor valuation criteria presented in chapter B9 (Application Reference Number: 6.2.9) the IACC Wildlife Sites are considered to be of medium value.

Habitats

1.13.49 Ty du comprised largely unmodified mire habitats indicative of varying chemistry across the site, with slightly acid, circumneutral and more base-rich conditions indicated, as well as drier areas. A large area of grey willow scrub occupies approximately 40% of the site.

1.13.50 The NVC surveys recorded the following plant communities:

- M5 Carex rostrata-Sphagnum squarrosum mire;
- M6 Carex echinata-Sphagnum recurvum/auriculatum mire;
- M16 Erica tetralix-Sphagnum compactum wet heath;
- M22 Juncus subnodulosus-Cirsium palustre fen-meadow;
- M23 Juncus acutiflorus/effusus-Galium palustre rush pasture;
- M25 Molinia caerulea-Potentilla erecta mire;
- M29 Hypericum elodes-Potamogeton polygonifolius soakway; and
- Species-rich Sphagnum mire.

1.13.51 A diversity of vascular plants and bryophytes associated with mire habitats were recorded, with the following notable species: bog pimpernel (*Anagallis tenella*); blunt-flowered rush (*Juncus subnodulosus*); many-stalked spike-rush (*Eleocharis multicaulis*); slender sedge (*Carex lasiocarpa*); and the mosses *Calliergon giganteum*, *Rhizomnium pseudopunctatum* and *Sphagnum contortum*.

1.13.52 The vegetation of some ditches and of the area around the septic tank to the northeast was indicative of long-term nutrient enrichment.

1.13.53 The willow scrub, hedgerow and marshy grassland habitat present is common and widespread within the locality and is considered to be of low value.

1.13.54 The rich-fen and mire habitats present within the site are nationally rare and are therefore considered to be of high value.

Species

1.13.55 Cofnod provided records (since 2007) of the following groups and species as shown on figure 13:

- Reptiles – adder;
- Breeding birds and wintering birds;
- Water vole; and

- Notable mammals – brown hare and hedgehog.

1.13.56 GCN were found to be present within a pond approximately 420m to the west of Ty du during eDNA sampling undertaken in 2016 (Appendix G9-2, Application Reference Number: 6.7.23).

1.13.57 Habitat with the potential to support amphibians and reptiles including dry stone walls, marshy grassland and scrub is present within Ty du. Given their protected status, and the presence and quality of habitat which might support the species, GCN and adder are assigned a medium and low value respectively.

1.13.58 Cofnod returned 50 notable bird species records from the desk study area. The habitats present within Ty du have the potential to support breeding and overwintering bird species, although given the bird records provided by Cofnod and the nesting, foraging and loafing habitats present on site, it is considered that Ty du is likely to support a range of breeding and overwintering species which are common and widespread within the area. As such, breeding and overwintering birds are assigned a low value.

1.13.59 One record of water vole within the last ten years was provided by Cofnod approximately 2km from the site. Given the quality of the habitat present and their protected status, the value of the water vole populations within Ty du is considered to be medium.

1.13.60 Ty du comprises habitats suitable to support notable mammals. Given their protected status and widespread distribution within Anglesey, this receptor is considered to be of low value.

Summary of receptors

1.13.61 In accordance with chapter B9 (Application Reference Number: 6.2.9), only those receptors considered to be present and of low, medium and high value are taken forward to assessment. Given the baseline data collected, table 1-22 shows the ecological receptors that were considered to be present or have the potential to be present on each compensation site, and have the potential to be affected by the proposed works.

Table 1-22 Summary of receptors taken forward for assessment at each site

Receptor	Value of receptor	Cae Canol-dydd	Cors Gwawr	Ty du
Corsydd Môn / Anglesey Fens SAC	High	X	X	
Caeau Talwrn SSSI	High	X	X	
Cors y Farl SSSI	High	X	X	
Cors Erddreiniog SSSI	High	X		
Cors Bodeilio SSSI	High	X	X	

Receptor	Value of receptor	Cae Canol-dydd	Cors Gwawr	Ty du
Gwenfro and Rhos y Gad SSSI	High	X	X	
Ancient Woodland	High	X	X	
IACC Wildlife Sites including the Tir Lleidiog Ty du Wildlife Site	Medium	X	X	X
Improved and marshy grassland, and scrub habitat	Low	X	X	X
Rich-fen and mire habitats	High	X	X	X
GCN	Medium	X	X	X
Reptiles	Low	X	X	X
Breeding birds	Low	X	X	X
Overwintering birds	Low	X	X	X
Bats	Medium	X	X	
Otter	Medium	X	X	
Water vole	Medium		X	X
Red squirrel	Medium	X	X	
Notable mammals	Low	X	X	X

Design basis and activities

1.13.62 This section, which sets out the design basis for this assessment of effects, is based on the description of the proposed development set out in section 1.2 and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). 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 possible adverse effects as inherent design features or by implementation of standard industry good working practice. A worst case scenario has been assessed from a terrestrial and freshwater ecology perspective based on the description of the proposed development and the assumptions and mitigation outlined below.

Construction

1.13.63 The construction of the SSSI compensation sites comprises habitat creation and enhancement as described in the Tre'r Gof SSSI compensation proposals for each site (Appendix D9-24, Application Reference Number: 6.4.57).

1.13.64 The assumption at all sites is that the works would be completed within a relatively short duration, phased over 12–24 months, with earthworks spread across two summer periods to minimise potential effects, and vegetation clearance taking place during winter months. A small construction team (less than 10 personnel) and number of plant would be employed (see section 1.2).

Cae Canol-dydd

1.13.65 The works associated with habitat creation and enhancement which could affect ecological receptors include the following.

- Removal of existing habitat via:
- creation of access tracks;
- topsoil stripping and re-landscaping;
- removal of scrub;
- mowing areas of black bog-rush and purple moor-grass; and
- drainage modifications.
- Seeding of key species to create new habitat.

Cors Gwawr

1.13.66 The works associated with habitat creation and enhancement which could affect ecological receptors include the following.

- Removal of existing habitat via:
- creation of access tracks;
- topsoil stripping and re-landscaping;
- removal of scrub; and
- drainage modifications.
- Seeding of key species to create new habitat.

Ty du

1.13.67 The works associated with habitat enhancement which could affect ecological receptors include:

- removal of scrub;
- mowing areas of purple moor-grass; and
- septic tank removal or repair.

Embedded mitigation

Cae Canol-dydd, Cors Gwawr and Ty du

1.13.68 Mitigation embedded in the proposals includes the following measures relevant to avoiding and reducing effects on ecological receptors, as set out in the Landscape and Habitat Management Strategy (Application Reference

Number: 8.16) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

- The design retains and protects, wherever practicable, hedgerows, trees (including root protection zones) and walls.
- The location of topsoil storage areas has been identified to mitigate potential adverse effects from habitat loss and nutrient/sediment runoff.
- Working hours would be:
  - Monday to Friday – 07:00 to 19:00; and
  - Saturday – 07:00 to 13:00.

Good practice mitigation

Cae Canol-dydd, Cors Gwawr and Ty du

1.13.69 Good practice during the construction phase includes the following measures which would be implemented via Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

1. 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). Pre-construction surveys would inform the need for and/or the detail contained within protected species mitigation/conservation licence applications. The provisions of any protected species licence would ensure there was no detriment to the maintenance of the favourable conservation status of the species affected within its natural range. 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.
2. 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.
3. To reduce effects on ecological receptors at particularly sensitive times of the year when the magnitude of any effect would have a greater impact on conservation status, the following would be implemented via the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7):
   - 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 [RD37]. 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).
- 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.
- Retained sensitive areas would be fenced off from potentially damaging or disturbing works.

4. If required, a mitigation strategy for adder and common lizard would be in place throughout habitat clearance, as outlined in the Ecology and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). This would consider the requirement for 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 pre-construction surveys and the presence of suitable habitats at the time of clearance. Trapped animals would be released into areas of adjacent retained habitat.
5. To prevent the introduction and spread of plants listed on Schedule 9 of the Wildlife and Countryside Act 1981, Horizon would prepare a Biosecurity Risk Assessment and Method Statement setting out how areas with the presence of Schedule 9 plant species would be demarcated, and how the contaminated materials would be appropriately

managed throughout the works. This would include 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 who has experience in identifying invasive non-native plant species would be provided. This would include photographs of the invasive non-native plant species known to be present on a site (and any other relevant pernicious species not listed). This measure is detailed in the Ecological and Landscape Management Strategy in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

Operation

1.13.70 The operational phase of the Ecological Compensation Sites comprises habitat management as described in Tre'r Gof SSSI compensation proposals for each site (Appendix D9-24, Application Reference Number: 6.4.57). No specific embedded or good practice mitigation has been proposed for the operational phase of the proposals.

1.13.71 The operational phase at all three sites comprises habitat management which is assumed to consist principally of low intensity grazing; vegetation cutting; and spot treatment of weed species. The ongoing management and maintenance of the site would be designed to avoid conflict with the legislation protecting the various species which are likely to be present on site.

Assessment of effects

1.13.72 The potential effects are summarised in table 1-23. Chapter B9 (Application Reference Number 6.2.9) sets out the methodology for how each effect has been assessed, and the determination of significance.

Table 1-23 Summary of pathways for environmental changes to affect ecological receptors

Potential effect	Actions during which the effects may influence ecological receptors	Ecological receptors potentially affected
Mortality and injury of protected and notable species	Topsoil stripping and re-profiling, vegetation clearance and work within drainage ditches leading to killing/injury of species present on site.	GCN Reptiles Breeding and overwintering birds Bats Otter Water vole

Potential effect	Actions during which the effects may influence ecological receptors	Ecological receptors potentially affected
		Red squirrel Notable mammals
Habitat loss/gain, fragmentation or modification	Topsoil stripping and re-profiling, vegetation clearance and work within drainage ditches removing existing habitat.	Statutory and non-statutory wildlife sites Habitats (limited to low-value grassland, hedgerows and scrub) GCN Reptiles Breeding and overwintering birds Bats Otter Water vole Red squirrel Notable mammals
Species disturbance (from changes to noise, vibration, visual and light stimuli)	Plant operation during topsoil stripping and re-profiling, vegetation clearance and work within drainage ditches.	GCN Reptiles Breeding and overwintering birds Bats Otter Water vole Red squirrel Notable mammals
Air quality changes (resulting in habitat loss/modification)	Plant operation during topsoil stripping and re-profiling, vegetation clearance and	Statutory and non-statutory wildlife sites

Potential effect	Actions during which the effects may influence ecological receptors	Ecological receptors potentially affected
	work within drainage ditches increasing nitrogen/acid deposition and/or atmospheric NOx levels. Adjacent sensitive sites may also be affected.	Rich-fen/mire habitat Grassland Hedgerow Scrub
Hydrological changes (resulting in mortality/injury of species and/or habitat loss/modification)	Topsoil stripping and re-profiling; vegetation clearance and work within drainage ditches releasing sediment/ nutrients into watercourses and increasing runoff. Sensitive receptors with hydrological connectivity to contaminated areas may also be affected.	Statutory and non-statutory wildlife sites
Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification)	The introduction of contaminated vehicles, machinery, or spoil onto site. Sensitive receptors with hydrological connectivity to contaminated areas may also be affected.	Retained habitats, notably rich-fen habitat Statutory and non-statutory wildlife sites

Construction

Cae Canol-dydd

1.13.73 There would be a loss of approximately 7.7ha of improved/marshy grassland, approximately 0.9ha of scrub and 500m of hedgerow. On completion of the topsoil strip, scrub clearance, seeding and drainage modification works, approximately 7.7ha of rich-fen habitat would be created and 4.8ha of existing fen habitat enhanced; a total of 12.5ha fen habitat.

1.13.74 Approximately 1.1ha of the site forms part of the Corsydd Môn / Anglesey Fens SAC and Caeau Talwrn SSSI. The fen habitat in this area would be enhanced through manual cutting of areas of rush and purple moor grass.

1.13.75 The risk of mortality and/ injury to the species receptors potentially present on site would be mitigated through the good practice measures outlined above. Species would be able to recolonise the areas of fen creation during

their establishment. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.76 The construction works would result in the loss of low-value habitat (improved/marshy grassland, hedgerow and scrub), and the creation and enhanced management of retained high value rich-fen habitat. The creation of high quality rich-fen habitat in place of low-value common and widespread habitats would constitute a major improvement in receptor quality, which represents a large magnitude of change. However, given the long-term and uncertain nature of fen habitat creation and establishment, this is assessed on a precautionary basis as a moderate beneficial effect.

1.13.77 No significant effects from species disturbance, changes in air quality or changes in surface water and groundwater are predicted for any ecology receptor with the application of embedded and good practice mitigation as detailed in the noise and vibration section, the air quality section and the surface water and groundwater section of this appendix. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.78 The provision and implementation of a Biosecurity Risk Assessment and Method Statement would mitigate the potential introduction and spread of invasive non-native plant species to a negligible level, and a negligible effect.

Cors Gwawr

1.13.79 There would be a loss of approximately 5.5ha of improved/marshy grassland, approximately 8.6ha of scrub, and 250m of hedgerow. On completion of the topsoil strip, scrub clearance, seeding and drainage modification works, approximately 6.1ha of fen habitat would be created and 8.2ha of existing fen would be enhanced; a total of 14.3ha of fen habitat.

1.13.80 The risk of mortality and/or injury to the species receptors potentially present on site would be mitigated through the good practice measures outlined above. Species would be able to recolonise the areas of fen creation during its establishment. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.81 The construction works would result in the loss of low-value habitat (improved/marshy grassland, hedgerow and scrub), and the creation and enhanced management of retained high value rich-fen habitat. The creation of high quality rich-fen habitat in place of low-value common and widespread habitats would constitute a major improvement in receptor quality, which represents a large magnitude of change. However, given the long-term and uncertain nature of fen habitat creation and establishment, this is assessed on a precautionary basis as a moderate beneficial effect.

1.13.82 No significant effects from species disturbance, changes in air quality or changes in surface water and groundwater are predicted for any ecology receptor with the application of embedded and good practice mitigation as detailed in the noise and vibration section, the air quality section and the surface and groundwater section of this appendix. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.83 The provision and implementation of a Biosecurity Risk Assessment and Method Statement would mitigate the potential introduction and spread of invasive non-native plant species to a negligible level, and a negligible effect.

Ty du

1.13.84 There would be a loss of approximately 3.1ha of scrub and the resulting enhancement of approximately 7ha of mire habitat.

1.13.85 The risk of mortality and/ injury to the species receptors potentially present on site would be mitigated through the good practice measures outlined above. Species would be able to recolonise the areas of mire during its establishment. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.86 The construction works would result in the loss of low-value scrub habitat and the enhanced management and expansion of retained high value mire habitat within the Tir Lleidiog Ty du Wildlife Site. This would constitute a major improvement in receptor quality, which represents a large magnitude of change. However, given the long-term and uncertain nature of mire establishment, this is assessed on a precautionary basis as a moderate beneficial effect in relation to terrestrial habitat and a minor beneficial effect in relation to the Tir Lleidiog Ty du Wildlife Site.

1.13.87 No significant effects from species disturbance, changes in air quality or changes in surface water and groundwater are predicted for any ecology receptor with the application of embedded and good practice mitigation as detailed in the noise and vibration section, the air quality section and the surface and groundwater section of this appendix. This would represent a negligible magnitude of change to these receptors, and a negligible effect.

1.13.88 The provision and implementation of a Biosecurity Risk Assessment and Method Statement would mitigate the potential introduction and spread of invasive non-native plant species to a negligible level, and a negligible effect.

Operation

Cae Canol-dydd, Cors Gwawr and Ty du

1.13.89 Operation of the three Ecological Compensation Sites would comprise limited management of habitats such as scrub clearance and grazing where required, and the monitoring and management of water levels within Cae Canol-dydd and Cors Gwawr. The activities required to manage the site are not predicted to affect the habitats or species within them.

1.13.90 The establishment of high quality rich-fen habitat at Cae Canol-dydd has the potential to strengthen the network of designated fen habitats, enhancing and linking units of Caeau Talwrn SSSI (constituent units of the Anglesey Fens SAC). At Cors Gwawr, the proposals would link separate units of Caeau Talwrn SSSI and Cors Bodeilio SSSI, the latter a constituent unit of the Anglesey Fens SAC. Linking and strengthening the resilience of fen habitat within Anglesey is assessed as an extensive enhancement of the receptor, which constitutes a large magnitude of change. The quality of the mire habitat within the Tir Lleidiog Ty du Wildlife Site would also be

enhanced. However, it is recognised that there is a degree of uncertainty over the full extent and final quality of the fen habitat being created and enhanced, so as a precaution the overall effect of these proposals is assessed as moderate beneficial.

Additional mitigation

1.13.91 There are no minor, moderate or major adverse effects predicted due to construction or operation of the Ecological Compensation Sites at Cors Gwawr, Cae Canol-dydd and Ty du. There is therefore no additional mitigation proposed.

Residual effects

1.13.92 It is assessed that, with embedded and good practice mitigation applied, there would be negligible effects on species receptors and significant positive effects on the adjacent designated sites and fen-rich/mire habitats found within the Cae Canol-dydd, Cors Gwawr and Ty du sites. This conclusion is carried forward to the residual effects section of chapter D9 (Application Reference Number: 6.4.9).

1.14 Landscape and visual

Study areas

1.14.2 The study areas for each site have been limited to a maximum of 1km offset from the Ecological Compensation Sites' boundaries as the nature of works is highly unlikely to be perceptible at any distance greater than this and in practice is expected to be considerably less.

1.14.3 A computer-generated Zone of Theoretical Visibility has not been generated as the nature of the proposed works is unsuitable for such an approach.

1.14.4 The study areas for Cae Canol-dydd and Cors Gwawr are illustrated on Figures 14 and 15.

1.14.5 The study area for Ty du is illustrated on Figures 16 and 17.

Baseline environment: landscape

1.14.6 The two types of landscape receptors that have been identified comprise specific landscape elements and landscape character. However, effects on landscape elements would also have an effect on the landscape character. The assessment of effects on landscape elements has therefore been incorporated into the assessment of effects on landscape character.

1.14.7 The study areas for Cors Gwawr and Cae Canol-dydd overlap to a degree and share many common characteristics; the landscape baseline for these proposed sites is therefore described together to avoid unnecessary repetition.

1.14.8 The Ty du site is geographically discrete; the landscape baseline for this site is therefore described separately.

Landscape context

1.14.9 The combined study areas for Cae Canol-dydd and Cors Gwawr are illustrated on figures 14 and 15. The study area for Ty du is illustrated on figures 16 and 17.

1.14.10 Cae Canol-dydd and Cors Gwawr are situated about 1.5 km northeast of Llangefni, the nearest county town.

1.14.11 The landscape is predominantly rural, consisting of a mosaic of fields in use for pasture with some arable land and areas of scrub. The settlement pattern is of scattered houses, farmstead, hamlets and small settlements interconnected by small roads and footpaths.

1.14.12 Groups of woodland and Ancient Woodland lie approximately 700m east of Cae Canol-dydd and 1km north-northwest of Cors Gwawr. Another woodland, which is not designated, lies approximately 1km southwest of Cors Gwawr.

1.14.13 The study area is dotted with small areas of scrub and fen due to the nutrient-poor quality of the soil. A number of separate areas of varying size comprise the designated SAC, *Corsydd Mon/ Anglesey Fens*; some of these parcels

are also designated as SSSIs. A group of land parcels comprising the *Caeau Talwrn* SSSI are also scattered within the study area. There is a small part of the SSSI within the Cae Canol-dydd site, with two smaller separate areas southeast of the site and a larger area further southeast from Cae Canol-dydd. These consist of a complex of small fields comprising mainly marshy grassland, fen and dry neutral grassland. The SSSI *Cors y farl*, also a designated SAC *Corsydd Mon/Anglesey Fens* is situated adjacent to the group of woodland and ancient woodlands mentioned above. A noticeably larger wetland, rich-fen system lying adjacent north of the Cors Gwawr site is a designated SSSI, *Cors Bodeilio*, as well as a designated SAC *Corsydd Mon/ Anglesey Fens.*

1.14.14 The field boundaries consist mostly of hedges of varying quality, some cloddiau and some low stone walls.

1.14.15 There are a number of small streams in the area, and marshland occurs at *Cors Bodeilio* SSSI.

Cae Canol-dydd

1.14.16 The Cae Canol-dydd site lies approximately 1.5km north of Llangefni and 1.5 km west of the village of Talwrn. It is bounded by hedgerows, sub-divided into 12 fields mainly given over to pasture. The B5110, a small road, runs along part of the western boundary of the site, whilst the rest of the site boundary is formed by the hedges of adjoining fields. The central portion is bounded on the east side by the small watercourse in the valley bottom.

1.14.17 The landform of Cae Canol-dydd comprises a shallow valley running approximately from the north-northeast and falling to the south-southwest. The B5110 follows the ridgeline to the west and a footpath through fields follows the ridgeline on the east side.

1.14.18 The Afon Canol-dydd, an ordinary watercourse, flows south-southwest along the valley bottom, and is fed by numerous drainage ditches draining the valley slopes. This stream is lined with dense vegetation and tall scrub.

1.14.19 There are scattered mature trees within the hedgerows across the site, some of which have made notable tree belts. Mature hedges and some cloddiau line most of the field boundaries except for the west border of the SSSI field, which is open with the adjacent field.

1.14.20 One part of the suite of the *Cae Talwrn* SSSI, lies in the middle of the site. It is also part of the designated *Corsydd Mon/Anglesey Fens* SAC. This small area is noticeably different from adjoining fields, featuring marshy species-rich grassland, fen, dry grassland, and transitions between those features.

1.14.21 There are no buildings present on site. There are a couple of residential properties, on the western side of the B5110, towards the southwest of the site. Neuadd Wen Farm is located on the B5110, a field away from the site boundary on the northwest side.

1.14.22 A ruined building now enclosed by mature trees lies immediately east of the site at the southern end. An overhead power line crosses the valley

diagonally from southeast to northwest but does not form an unduly intrusive feature.

1.14.23 A public footpath follows the length of the site along the valley bottom, from a point on the lane to the north, southwest to the southern end of the site. This links to a second footpath through adjacent fields, offset approximately 260 metres to the east of the site which runs along a parallel ridgeline.

Cors Gwawr

1.14.24 The Cors Gwawr site is located southeast of the small village of Talwrn in southeast Anglesey. The site is very roughly an inverted 'V'-shape. It is bounded by hedgerows, sub-divided into nine small fields, mostly given over to permanent pasture.

1.14.25 The Cors Gwawr lies in a shallow valley sloping in a north-easterly direction, with three sub-valleys extending towards the centre of the site. It is enclosed by higher grounds to the north, east and south-southwest. A low ridge of land separates the broader section of the site at the southern-most end.

1.14.26 There are various inflows into Cors Gwawr, although most drainage ditches rise within the site. A complex network of drainage ditches flow into a main watercourse which rises on the western border, flowing northeast through the centre of the valley.

1.14.27 Small roads bound the southeast and southwest parts of the site. A further small lane bounds part of the northwest edge of the site.

1.14.28 The site borders the Cors Bodeilio SSSI on the northern edge, also a designated SAC Corsydd Mon/Anglesey Fens. Part of the SSSI is a nature reserve rich in fen, and is an area of NRW open access land.

1.14.29 Hedges form some of the boundaries of fields comprising the site, and denser areas of mature trees and scrub occur along the northwest boundary of the site creating enclosure. A line of mature trees along the watercourse in the valley bottom creates further enclosure. The broad northeastern part of the site is more open with ditches forming field boundaries. Dense scrub also lines the ditch forming the northwest edge of the southern arm of the site.

1.14.30 The boundary with the roads to the southwest and southeast are more open with scattered mature trees, scrub and bracken along the low hedgerows. A significant feature in the southern part of the site is a mature double hedge with mature trees lining an old track.

1.14.31 There are a few scattered properties along the road just beyond the northwest boundary, with other farm properties scattered in fields situated at a further distance from the eastern edge of the site.

1.14.32 The site is crossed by two footpaths; one from the road at the southwest of the site, diagonally to the small local road to the east, and another from this lane on the east in a north-westerly direction, linking to the track on the boundary along the northwest of the site.

Ty du

1.14.33 The proposed site is located approximately 0.7 km from the north coast of Anglesey and about 200m north of the A5025, roughly midway between Cemaes and Amlwch.

1.14.34 The area is rural farmland and the site occupies an irregular area of land within a shallow valley largely covered with rough scrub. It is surrounded by a pattern of small fields interspersed with small rocky outcrops and hillocks with dense scrub cover to the north and west.

1.14.35 From the coastline, the land rises southwards inland towards a ridge of land which separates the site from the coast. The area north of the A5025 is designated as an Area of Outstanding Natural Beauty (AONB), including the site and its immediate surroundings.

1.14.36 There are a few scattered houses in the area including small groups along the A5025. A small lane winds around the site to the east and north. There are a number of footpaths in the area including the Wales Coast Path.

Landscape character

National landscape character

1.14.37 Effects on landscape character have been assessed at a scale proportionate to the nature and scale of the proposed Ecological Compensation Sites and their landscape context. The assessment of potential effects on landscape character is therefore made for designated landscapes (the Isle of Anglesey AONB) and at the local landscape character level within the study areas. Assessment of the potential effects on landscape character at national and county council level has been scoped out of this assessment.

1.14.38 Reference is made to national level landscape character for context only. The relative scale and nature of the proposed works at all three sites would have no effect at a national scale.

1.14.39 However, since there is no landscape character assessment for the Isle of Anglesey AONB, the baseline data for landscape character of the AONB is drawn from relevant landscape character areas in the *Isle of Anglesey County Council Landscape Strategy, Update 2011* [RD34]

1.14.40 To determine local landscape character for each site reference has been made to LANDMAP Level 3 Visual and Sensory Aspect Area data [RD35] and visual sources available for desk study, as noted above.

Cae Canol-dydd and Cors Gwawr

1.14.41 At a national level, both of these sites fall within the National Landscape Character NLCA02 Central Anglesey [RD36]. The relative scale and nature of the proposed works would have no effect at a national scale and is therefore not considered further at this level.

1.14.42 The landscape character context for assessment of landscape effects for Cae Canol-dydd and Cors Gwawr is illustrated on Figure 14 and below in table 1-24 and table 1-25 respectively.

Table 1-24 Cae Canol-dydd: landscape character context

Landscape character	Published source
Local landscape character context	YNSMNVS012 Central Smooth Belt: Lowland/Rolling Lowland/Open Rolling Lowland LANDMAP VSAA (Level 3) [RD36]

Table 1-25 Cors Gwawr: landscape character context

Landscape character	Published source
Local landscape character context	YNSMNVS022 Pentraeth Valleys: Lowland/Lowland Valleys/Open Lowland Valleys LANDMAP VSAA (Level 3) [RD36]

Local landscape character

Cae Canol-dydd

1.14.43 The local landscape character of the Cae Canol-dydd study area is summarised below by reference to NRW LANDMAP Level 3 information [RD36].

1.14.44 The Cae Canol-dydd site lies within the LANDMAP Visual and Sensory aspect area Central Smooth Belt, classified as Lowland /Rolling Lowland/ Open Rolling Lowland (Level 3).

1.14.45 This character is generated primarily by pasture over undulating topography with some arable land and medium to large-sized fields with hedges, some hedgebanks (cloddiau) and stone walls. The area also features some wetlands and copses. It is criss-crossed by a network of mainly small roads, lanes and footpaths, with many scattered houses and farms, hamlets and small villages.

1.14.46 Two areas of wetland forming part of the Caeau Talwrn SSSI and Corsydd Mon / Anglesey Fen SAC occur within and adjacent to the proposed site.

1.14.47 It is considered to be a relatively attractive, tranquil area, which feels settled, with scattered ancient monuments, hamlets and small villages.

1.14.48 This area has been evaluated as of moderate value, being a generally pleasant, unspoilt rural landscape of unremarkable character with some long distance views to Snowdonia.

Cors Gwawr

1.14.49 The local landscape character of the Cors Gwawr study area is summarised below by reference to NRW LANDMAP Level 3 information [RD35].

1.14.50 The Cors Gwawr site lies within the LANDMAP Visual and Sensory aspect area Pentraeth Valleys, classified as Lowland/Lowland Valleys/Open Lowland Valleys (Level 3) [RD36].

1.14.51 The landscape consists predominantly of organised field patterns for farming use, over a rolling topography of low, gently rounded ridges with wide, flat-

bottomed valleys between, offering a sense of enclosure due to restricted views.

1.14.52 The dominant pasture fields are bounded by low hedges with few trees on the ridges. Hedges, copses, small lanes and marshland are key elements forming part of the character of this area. There are a number of nature reserves and nature conservation areas with marshland and fens in the valleys, as illustrated on figure 15. These landscape components are influential on the selection of proposed locations for the Ecological Compensation Sites with Cors Bodeilio and part of Caeau Talwrn adjacent to the site.

1.14.53 This area has been evaluated as having an overall evaluation of moderate. It is considered to be a generally pleasant and quiet rural landscape with gentle ridges and valleys giving a sense of place but without distinct landmarks.

Ty du

1.14.54 At a national level, the Ty du sites falls within the National Landscape Character NLCA01 Anglesey Coast [RD37].

1.14.55 The landscape character context for assessment of landscape effects for Ty du are illustrated on figure 16 and set out below in table 1-26.

Table 1-26 Ty du: landscape character context

Landscape receptor	Receptor details
Designated landscape	Anglesey AONB IACC LCA 4 North West Coast IACC LCA 5 North West Anglesey
Local landscape character context	YNSMNVS0211 North Coast Hinterland: Lowland / Rolling Lowland / Mosaic Rolling Lowland LANDMAP VSAA (Level 3) [RD36]
Local landscape character context	YNSMNVS010 Drumlins with Windfarms: Lowland / Rolling Lowland / Open Rolling Lowland LANDMAP VSAA (Level 3) [RD36]

Designated Landscape

1.14.56 The proposed site and the major part of the related study area lies within the Isle of Anglesey AONB with the southern boundary following the A5025. Within the study area, the AONB forms a relatively narrow band along the coast a little more than one kilometre in width, comprising the coastal hinterland and adjacent farmland. Agriculture is the main land use type in the AONB with features such as hedgerows, walls and cloddiau integral to the landscape pattern.

1.14.57 Within the northern part of the study area the AONB includes the distinctive rocky coastline, and reflects the essence and character of the coast, whereas

further west it includes sandy bays and coves, interspersed with rocky cliffs and headlands.

1.14.58 The landscape elements reflect its coastal character; intertidal and cliff slope. Several areas within the AONB have been designated for nature conservation. Northeast of the Ty du site, the Porth Wen brickworks are a relic of past industry.

1.14.59 A long distance footpath, the Wales Coast Path, provides accessibility along most of the AONB and a number of areas are owned by the National Trust. There are a number of other footpaths and an area of open access land a short distance north of the Ty du site. The AONB also includes an area of open access land covering higher land and the coastal landscape to the north (see figure 17).

1.14.60 The southern part of the AONB encompassing the Ty du site is more influenced by the hillocky topography of drumlins, trending in a southwest to northeast direction, which were formed from deposition of boulder clay following the retreat of the last ice age. This drumlins field is largely given to improved grassland, with some marshy grassland and small scattered areas of scrub to be found amongst the drumlins. There are also extensive areas of scattered rocky outcrops. Dry ericaceous heath and acid grasslands intermingle with marshy areas in lower-lying areas.

Local landscape character

1.14.61 The local landscape character of the Ty du site is summarised below by reference to LANDMAP Level 3 information [RD35].

1.14.62 The site lies entirely within the LANDMAP Visual and Sensory aspect area North Coast Hinterland [RD35], classified as Lowland/Rolling Lowland/ Mosaic Rolling Lowland, the southern boundary of which is coincident with the southern boundary of the AONB, along the A5025.

1.14.63 The North Coast Hinterland is characterised by its small-scale intricate pattern of winding lanes with glimpses of the coast, and scattered small craggy hillocks and sheltered small valleys. There are scattered houses and a pattern of small fields. It is attractive and distinctive with a strong influence of the contrasting exposed coastline.

1.14.64 South of the A5025, the southern part of the study area for Ty du lies within the LANDMAP Visual and Sensory aspect area Drumlins with windfarms [RD35]; classified as Lowland/Rolling Lowland/Open Rolling Lowland.

1.14.65 This area is characterised by the post-glacial landscape of smooth oval hillocks, the generally open aspect and pattern of large regular fields of pasture with hedges. Groups of wind turbines are a dominant feature contrasting with the pattern of scattered farms and network of small lanes.

Landscape sensitivity

1.14.66 The sensitivity of landscape and visual receptors is established by determining the value given to a receptor and its susceptibility to the particular form of change likely to result from the proposed development.

1.14.67 The value of the Pentraeth valleys local landscape character (for the Cors Gwawr site) is considered to be moderate as noted above. The susceptibility to changes potentially arising from the proposed works medium, reflecting the moderate scenic quality. The local landscape character for Cors Gwawr is therefore considered to be of medium sensitivity.

1.14.68 The value of the Central smooth belt local landscape character (for the Cae Canol-dydd site) is considered to be moderate and the susceptibility to changes potentially arising from the proposed works medium. The local landscape character for Cae Canol-dydd is therefore considered to be of medium sensitivity.

1.14.69 The value of the North Coast Hinterland (for the Ty du site) is high due to the quality of its scale, character and the sea views. This high value is also reflected in its coincidence with the Anglesey AONB. The susceptibility to change from the type of works proposed (i.e. vegetation management) is medium. The landscape sensitivity is therefore assessed as high.

1.14.70 The value of Drumlins with windfarms local landscape character (also for Ty du) is considered moderate due to mixture of features derived from an unremarkable, pleasant rural landscape and the dominant character resulting from the superimposition of the many wind turbines. The susceptibility to change from the type of works propose is low; therefore, the sensitivity is considered to be medium.

Baseline environment: visual

1.14.71 The potential visual receptors within the study areas comprise walkers on local footpaths, a few scattered rural residential properties and users of local roads. For the Ty du site only, receptors also include walkers on the Wales Coast Path and people using the open access land along the coast.

1.14.72 Locations for receptors which have been used for this assessment are shown on figures 18, 19 and 20.

1.14.73 The following tables list the visual receptors for each site (table 1-27 to table 1-32).

Table 1-27 Cae Canol-dydd visual receptors

Visual receptor	Description
Walkers on PRoWs	
FP 1	Users of one footpath through site.
FP 2	Users of two footpaths to southeast of site; from ridgeline and fields outside site.
Community / residential	
R1	Residents to west of site. (two properties at Merddyn-hafod).
R2	Residents in properties to northwest of site.

Visual receptor	Description
Users of the local road network	
T1	Travellers on B5110 to west of site.
T2	Travellers on lane to north of site.

Table 1-28 Cors Gwawr visual receptors

Visual receptor	Description
Walkers on PRoWs	
FP 1	Users of PRoWs (two sections of footpath through site).
FP 2	Users of PRoWs (footpath to north outside of site).
Community / residential	
R1	Residents to south of site (1 property: Graig-Las).
R2	Residents in properties to northwest and north of site.
Users of the local road network	
T1	Travellers on lane to southeast edge of site.
T2	Travellers on local road to southwest of site.
T3	Travellers on lane along northwest boundary of site.

Table 1-29 Ty du visual receptors

Visual receptor	Description
Walkers on PRoWs	
FP 1	Users of PRoWs (1 footpath bounding western side of site).
FP 2	Users of PRoWs (1 footpath off-site, to northwest of site).
FP 3	Users of PRoWs (2 footpaths off-site, to northeast of site).
FP4	Users of Wales Coast Path.
Public / Recreational Areas	
REC 1	Users of open access land within AONB (clear panoramic views from Graig Wen - elevated land overlooking site).
Community / residential	
R1	Residents to east of site (1 property: Ty du).

Visual receptor	Description
R2	Residents in properties to north of site (2 cottages with potential glimpsed views).
R3	Residents in properties to south of site (various houses at Betws along A5025).
Users of the local road network	
T1	Travellers on A5025 to south of site (clear views towards site from elevated land).
T2	Travellers on lane to east and north of site (glimpsed and clear views towards).

Visual sensitivity

1.14.74 The sensitivity of visual receptors varies between categories of receptor and within categories depending on a range of factors as detailed in the methodology in chapter B10 (landscape and visual) (Application Reference Number: 6.2.10). The attribution of sensitivity for visual receptors for the three sites is summarised, as follows:

Cae Canol-dydd and Cors Gwawr

1.14.75 For the Cors Gwawr and Cae Canol-dydd sites, views from footpaths within the study areas are of value locally but are not associated with any designated or high quality landscapes and these receptors are therefore assessed as of medium value. However, the susceptibility to change for paths running through the sites is high, and their sensitivity is therefore, also high.

1.14.76 Residential receptors near the Cors Gwawr and Cae Canol-dydd sites are assessed as having a high sensitivity generally, in consideration of the high susceptibility to change of their rural views potentially arising from the proposed works and the moderate value of such views from properties.

1.14.77 The value of views for users of the local road network near the Cors Gwawr and Cae Canol-dydd sites are not associated with designated or high quality landscapes; the value of these is therefore considered to be low. The views from busier roads would have a lower susceptibility to changes of those view, therefore giving rise to a low sensitivity for such receptors. Views from small local lanes and tracks are likely to be more highly valued by users, therefore having a medium susceptibility to change, giving rise to a medium sensitivity for such receptors.

Table 1-30 Cae Canol-dydd sensitivity of visual receptors

Receptor reference	Description	Sensitivity
Walkers on PRoWs		
FP 1	Representative view for users of one footpath through site.	High

Receptor reference	Description	Sensitivity
FP 2	Representative view for users of two footpaths to southeast of site; from ridgeline and fields outside site.	High
Community / residential		
R1	Representative view for residents to west of site (two properties at Merddyn-hafod).	High
R2	Representative view for residents in properties to northwest of site.	High
Users of the local road network		
T1	Representative view for travellers on B5110 to west of site.	Low
T2	Representative view for travellers on lane to north of site.	Medium

Table 1-31 Cors Gwawr sensitivity of visual receptors

Receptor reference	Description	Sensitivity
Walkers on PRoWs		
FP 1	Representative view for users of PRoWs (two sections of footpath through site).	High
FP 2	Representative view for users of PRoWs (footpath to north outside of site).	Medium
Community / residential		
R1	Representative view for residents to south of site (one property: Graig-Las).	High
R2	Representative view for residents in properties to northwest and north of site.	High
Users of the local road network		

Receptor reference	Description	Sensitivity
T1	Representative view for travellers on lane to southeast edge of site.	Medium
T2	Representative view for travellers on local road to southwest of site.	Low
T3	Representative view for travellers on lane along northwest boundary of site.	Medium

Ty du

1.14.78 For footpaths adjoining and near to the Ty du site, all are considered to be of high sensitivity due to their situation within the AONB where enjoyment of the landscape setting is likely to be a primary factor, all therefore having a high value and potentially a high susceptibility to small changes in the landscape pattern or fabric.

1.14.79 For residential properties near the Ty du site, the value of views is assessed as high due to the unspoilt AONB setting.

1.14.80 Near Ty du the value of views from the A5025 is considered medium as the view over the AONB is a component of the experience of receptors using this route. The nature and scale of the proposed works is unlikely to be perceived by travellers from this road, giving rise to a low susceptibility to change. The sensitivity of this receptor is therefore medium.

1.14.81 Views from the unclassified local road north and east of the site are likely to be valued by users appreciating the AONB landscape, giving a medium value, and the scale of the proposed works is likely to give rise to a medium susceptibility to change for this receptor, therefore giving a medium sensitivity for people using this minor road.

Table 1-32 Ty du sensitivity of visual receptors

Receptor reference	Description	Sensitivity
Walkers on PRoWs		
FP 1	Representative view for users of PRoWs (footpath bounding western side of site).	High
FP 2	Representative view for users of PRoWs (footpath off-site, to northwest of site).	High
FP 3	Representative view for users of PRoWs (two	High

Receptor reference	Description	Sensitivity
	footpaths off-site, to northeast of site).	
FP4	Representative view for users of coastal path (National Trail).	High
Public / Recreational Areas		
REC 1	Representative view from open access land within AONB (clear panoramic views from Graig Wen - elevated land overlooking site).	High
Community / residential		
R1	Representative view for residents to east of site. (one property: Ty du).	High
R2	Representative view for residents in properties to north of site. (Two cottages with potential glimpsed views).	High
R3	Representative view for residents in properties to south of site (various houses at Betws along A5025).	High
Users of the local road network		
T1	Representative view for travellers on A5025 to south of site (clear views towards site from elevated land).	Medium
T2	Representative view for travellers on lane to north and east of site (glimpsed and clear views towards site).	Medium

Design basis and activities

1.14.82 The landscape and visual assessment has been based on the description of the proposed development set out in section 1.2 of this appendix and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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 possible adverse effects as inherent design features or by implementation of standard industry good working practice.

1.14.83 The assessment is based on the worst case scenario in terms of the design from a landscape and visual perspective, based on the description of the proposed development and the assumptions and mitigation outlined below. However, it may not be fully representative of a worst case scenario because the assessment was based on a desk study rather than site survey data, such that the magnitude of change for the receptors of some effects may be greater than the desk study indicates.

Assumptions for landscape and visual assessment

1.14.84 The following timescales have been assumed for construction and operation.

- Initial scrub clearance and removal of field boundary hedges in areas of proposed soil striping would be a winter activity between the beginning of November and end of February within the same construction year.
- Scrub clearance for the Ty du site is anticipated as taking place in a single tranche of work during the winter period.
- Stripping of existing pasture and topsoil for the creation of new wetlands is assumed to be a spring and summertime operation within the same construction year.
- Changes from the deposition of soil stockpiles at Cae Canol-dydd and Cors Gwawr are assumed to be short-term, reversible, with the removal of soil stockpiles by excavation for reuse of soil off-site, within a five-year period (a maximum of three years from stripping). Removal of soil stockpiles is not included in this assessment.
- Embedded and good practice mitigation measures taken into consideration in the initial assessment of potential effects are set out below.

Embedded mitigation

1.14.85 Horizon would retain field boundaries outside of soil-stripping areas or field access locations, as set out in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16); this forms an embedded mitigation measure.

Good practice measures

1.14.86 In order to mitigate potential effects on landscape and visual receptors during construction, the ecology and landscape management strategy set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) would be followed. Compliance with the Wylfa Newydd CoCP (Application Reference Number: 8.6) would be secured through a DCO requirement. Relevant

measures in the Wylfa Newydd CoCP (Application Reference Number: 8.6) include:

- protection of existing trees, scrub and hedgerows to be retained in accordance with the recommendations in BS5837: 2012 *Trees in Relation to Design, Demolition and Construction* [RD38]; as outlined in the ecology and landscape strategy in section 11 of the Wylfa Newydd CoCP (application document reference 8.6);
- soil stockpiles would not exceed two metres in height in accordance with recommendations in BS3882: 2015 *Specification for Topsoil* [RD39], as set out in the main Power Station Site sub CoCP; and
- soil stockpiles would be seeded with an appropriate, low-maintenance grass-seed mix.

Activities and factors considered

1.14.87 The following specific aspects of the scheme are considered relevant to the assessment of landscape and visual effects.

Cae Canol-dydd and Cors Gwawr

- Scrub clearance and hedge removal (construction: short-term changes and operation: long-term changes).
- Soil stripping (short-term changes).
- Haulage routes during construction (short-term changes).
- Location and shape of soil storage mounds (construction and operation; short-term changes).
- Conversion to open wetland vegetation (permanent changes).
- Long-term vegetation management and appearance of sites (site-wide issues).

Ty du

- Scrub clearance (construction: short-term changes and operation: long-term changes).
- Conversion to open wetland vegetation (permanent changes).
- Long-term vegetation management and appearance of sites (site-wide issues).

Assessment of landscape effects

1.14.88 The assessment of landscape effects is set out below.

1.14.89 The assessment considers the potential effects associated with the construction and operation of the Ecological Compensation Sites at the following assessment timeframes:

- construction (short-term);

- operation, year 1 (short-term); and
- operation, year 15, (long-term).

1.14.90 The significance of effects is assessed by considering the sensitivity of receptors in relation to the predicted magnitude of change: after taking into consideration the embedded and good practice mitigation measures incorporated within the project design and Wylfa Newydd CoCP (Application Reference Number: 8.6).

1.14.91 All construction activities are anticipated within a one-year period with scrub and hedgerow removal taking place in the winter months and soil stripping and initial stockpiling taking place during spring and summer months.

1.14.92 Operational activities are anticipated as low intensity grazing, with potentially occasional additional supplementary scrub clearance as necessary to maintain open wetland habitats.

Construction effects on landscape character

1.14.93 A summary of the potential effects likely to arise from the construction is presented below for each of the key groups of landscape and visual receptors, for each of the three sites.

Cae Canol-dydd

1.14.94 At Cae Canol-dydd, during construction, there would be direct effects on the local landscape character of the Central smooth belt. Physical effects at this site would also be limited to within the site, with some inter-visibility from a short distance, also unlikely to be greater than 500 metres from within the local landscape. There would be short-term, direct effects on the landscape pattern from the removal of approximately 330 metres of hedges within two separate soil stripping areas. The larger expanse of soil stripping would be in the broader, more open valley floor at the south end of the site with the second smaller area confined to a narrower band in the centre of the site. There would be local changes to landform with the creation of two soil stockpiles at the southwest of the site, close to the B5110 and another at the north of the site near a local lane. Soil stockpiles would contrast with natural landforms.

1.14.95 Similar to the resultant effects at Cors Gwawr, these localised changes from removal of hedges would result in a reduced sense of enclosure and localised change to the pattern of small fields. There would be a localised erosion of landscape character from the introduction of uncharacteristic elements, such as the soil stockpiles, but the scale of change in the context of the wider landscape and valley setting would represent only a small adverse magnitude of change, during the short term. This would result in a minor adverse and not significant effect.

Cors Gwawr

1.14.96 There would be no effect on any designated landscapes as none lie within the study area.

1.14.97 At Cors Gwawr, during construction, there would be direct effects on the local landscape character of the Pentraeth valleys. Physical effects would be contained within the site, with some inter-visibility up to a short distance of no more than 500 metres from within the local landscape. There would be short-term, direct effects on the landscape pattern resulting from the removal of approximately 250 metres of hedges within three separate soil stripping areas, removal of some scrub and small trees, and local changes to landform with the creation of soil stockpiles contrasting with natural landforms at the southwest of the site, near two Minor roads.

1.14.98 These localised changes in established vegetation cover within the valley floor landscape would result in a reduced sense of enclosure and a localised erosion of landscape character from the introduction of uncharacteristic elements, such as the soil stockpiles. This would give rise to a small adverse magnitude of change, during the short term. This would result in a minor adverse and not significant effect.

Ty du

1.14.99 The effects on the Isle of Anglesey AONB within the study area would result from low-key localised changes within the existing context of a matrix of small-scale fields, rocky outcrops and frequent scattered clumps of scrub. Changes resulting from the removal of scrub and exposure of existing low level vegetation would not appreciably alter the pattern of land use, although there would be a slight change in composition of the constituent vegetation types. Works entailing removal of encroaching scrub and restoration of open wetland habitats would also restore the former, more open local landscape character which existed prior to reduction of grazing.

1.14.100 The removal of scrub would result in a negligible adverse magnitude of change, during the short term. This would result in a minor adverse and not significant effect.

1.14.101 The effects on the North Coast Hinterland would be identical to those for the AONB, as described above. Similarly, the removal of scrub would give rise to a small adverse magnitude of change, during the short term. This would result in a minor adverse and not significant effect.

1.14.102 Potentially, there would also be indirect effects for the local landscape character of the Drumlins with Windfarms to the south of the A5025. Due to the distinct delineation of the local character areas as defined by this main road, the small scale and low-key nature of changes within the area to the north of the road would have a negligible adverse magnitude of effect, resulting in a negligible significance of effect for this receptor which would not be significant.

Operational effects on landscape character

1.14.103 Effects on landscape character during the first winter of operation following construction would, in general terms, be the same as the construction period with effects on landscape character from physical changes not differing in any substantial way. New vegetation such as seeding on soil stockpiles would only just be beginning to establish and areas stripped of soil or cleared

of scrub for wetland habitat creation would not be showing any perceptible regrowth of vegetation. Where mature hedges, scrub and small trees were removed, there would be an increased sense of open character and erosion of characteristic features at a local level. Newly formed soil stockpiles would contrast with the natural topography.

Operation: winter year 1

Cae Canol-dydd

1.14.104 At Cae Canol-dydd, during the first winter of operation the effects on Central Smooth Belt would also be localised. Specific effects derived from changes to landscape components would be similar to those described in the preceding paragraph for Cors Gwawr. These localised changes would result in a slight reduction in sense of enclosure which would not be significant in the context of the wider landscape character and the valley setting. The adverse short-term magnitude of change would therefore give rise to a negligible adverse significance of effect which would be not significant.

Cors Gwawr

1.14.105 At Cors Gwawr, the effect at a local level within the Pentraeth Valleys, would be apparent from the extensive areas of bare soil exposed by soil stripping and soil stockpiles would contrast with the natural landform. There would be a reduced sense of enclosure, which would be noticeable locally with a related small adverse short-term magnitude of change, giving rise to a negligible adverse significance of effect which would be not significant.

Ty du

1.14.106 At Ty du, in the first winter, there would be changes evident from the removal of scrub resulting in a generally more open character being created in the area local to the proposed site. The recently cleared area would likely to be evident as a patch of differing colour and texture contrasting with the surrounding pattern of pastures and retained areas of scrub. The resultant effects on the AONB and local landscape character of the North Coast Hinterland would be similar to the effects during the construction phase and therefore would result in only a small adverse magnitude of change, during the short term. This would result in a minor adverse and not significant effect for both of these receptors.

1.14.107 Indirect effects for the Drumlins with windfarms local character area would be similar to those for the construction phase; the small scale and low-key nature of changes to the north of the A5025 main road would have a negligible adverse magnitude of effect, resulting in a negligible significance of effect for this receptor which would be not significant.

Operation: summer year 15

Cae Canol-dydd and Cors Gwawr

1.14.108 For both Cae Canol-dydd and Cors Gwawr, by the summer of year 15 during the operational phase, the soil storage stockpiles would have been removed

(they are actually proposed to be removed within 3 years of placement) and these areas restored to grassland. In the medium to long term, areas stripped of soil for the creation of new wetlands and fen habitat would have revegetated and the loss of hedges and reduction of scrub would no longer be apparent. Generally, these areas of habitat creation would be integrated with the wider landscape pattern. Any effects would be of negligible adverse magnitude, having a negligible significance of effect and would be not significant.

Ty du

1.14.109 For Ty du, by the summer of year 15, the native wetland vegetation would have regenerated, replacing any rough or bare areas exposed by initial scrub removal. There is likely to be some natural re-growth of scrub, so a natural mosaic of varied target habitats, with a small proportion of scattered scrub, would be expected as a result of the proposed low-intensity grazing by livestock. This mix of vegetation types would be in keeping with the prevailing landscape character throughout the study area, and the site would be fully integrated in to the overall landscape pattern without any adverse effects.

1.14.110 The direct effects on the AONB would therefore be of negligible adverse magnitude, having a negligible significance of effect which would be not significant.

1.14.111 The direct effects on local landscape character of the North Coast Hinterland would be the same as those identified for the AONB, therefore these would also be of negligible adverse magnitude, having a negligible significance of effect which would be not significant.

1.14.112 Similarly, indirect effects on the local landscape character of the Drumlins with windfarms would be indiscernible, as the site would be fully integrated into the wider landscape pattern. Any effects for this receptor would therefore be of negligible adverse magnitude, having a negligible significance of effect which would be not significant.

Assessment of visual effects

1.14.113 The assessment of visual effects for all three sites is set out in table 1-33 to table 1-35 and is summarised below.

Limitations of visibility of proposed works

1.14.114 Views of the proposed sites are expected to be limited to fairly close range local views, restricted by topography and existing features such as hedges and established trees. The proposed works would not appear markedly out of keeping with the rural site settings. Soil stockpiles, where used, would not exceed two metres in height and therefore would not be visually prominent over a wide area.

Construction effects on visual receptors

Cae Canol-dydd

1.14.115 During construction, users of a footpath running along on the ridge to the east, parallel to the site location within the valley bottom, of and a short section adjacent to the site boundary in the southeast, would potentially experience clear views of all aspects of site clearance and construction activity. This receptor, FP2, has a medium adverse magnitude of effect giving rise to a moderate adverse significance of effect; which would be significant in short-term.

1.14.116 Two residential properties represented by receptor R1 would also experience significant adverse effects due to the close proximity of a soil storage stockpile which would result in partial obstruction of the existing open and long distance views of unspoiled countryside. There would also be views of machinery movements in close proximity to house and garden (approximately 25 metres distant). The larger area of soil stripping and hedge removal in the valley bottom would also be likely to be visible, contributing to the adverse effect. This short-term medium adverse magnitude of effect would give rise to a moderate adverse significance of effect; which would be significant in the short term.

1.14.117 Other receptors including users of footpaths, residents and users of local road networks would not experience any significant adverse effects, which are all of either minor or negligible adverse significance of effect.

Cors Gwawr

1.14.118 Two receptor locations would be affected by short term significant effects during construction:

1.14.119 Users of the section of the footpath across the site, FP1, which is not directly impacted by physical works and which is likely to remain open, would experience direct, close views of hedge and scrub removal, soil stripping and stockpiling. This would result in a short term medium adverse magnitude of change and a moderate adverse significance of effect, which would be significant in the short term.

1.14.120 Users of the local road, T1, along the southeast edge of the site would have clear open views over an open verge and low hedge of works at the southern end of the site, including scrub removal and construction of soil storage stockpiles. The non-naturalistic form of stockpiles would contrast adversely with natural gentle gradients of local landform. Views of hedge removal and soil stripping would also be possible along the length of the route. This would result in a short term medium adverse magnitude of change and a moderate adverse significance of effect, which would be significant in the short term.

1.14.121 The remaining receptors, including a few residential properties, would not be affected by any significant effects from construction. Due to the generally localised impacts and intervening topography and established vegetation, the significance of effects for all other receptors would be either minor or negligible adverse.

Ty du

1.14.122 During construction users of the footpath FP1 adjacent to the west side of the site would potentially experience close views of scrub clearance and burning of arisings, across the site with progressive opening up of the site. This would give rise to a short-term medium adverse magnitude of effect lasting for about one year before vegetation started to regenerate, with a moderate adverse significance of effect, which would be significant.

1.14.123 Residents at Receptor R1 (Ty du farmhouse) would also potentially have clear views towards the site, with visibility of scrub clearance work and burning of arisings within wider views. However, some of the site would be partially concealed in shallow valley. This would have a small adverse magnitude of effect in the short term, giving rise to a moderate adverse significance of effect, which would be significant in the short term.

Operational effects on visual receptors

1.14.124 The effects arising from operation: winter year 1 would be very similar to those during construction. Construction works would be completed in the summer months with little time for any significant growth of newly planted vegetation or natural re-colonisation of vegetation before the first winter. The assessment of effects at operation (winter year 1) is therefore effectively of the newly completed site works, with the only notable difference being the absence of construction activities, site equipment and machinery.

Operation: winter year 1

Cae Canol-dydd

1.14.125 Users of footpath FP1 through the site, when it is reopened on completion of construction, would experience unimpeded, close views of areas stripped of soil for newly created wetlands and the removal of hedges from stripped areas would be apparent. Soil stockpiles would also be visible at close range with their forms contrasting with the natural landform. These would represent a short-term, medium adverse magnitude of change, resulting in a moderate adverse significance of effect in the short term.

1.14.126 Two receptors, FP2 and R1, that would be affected by short term significant effects during construction would still be affected by the same level of significance of effect during the first winter after completion of the works, i.e., both would experience moderate adverse significance of effect in the short term.

1.14.127 Effects for all other visual receptors would not be significant.

Cors Gwawr

1.14.128 Short-distance views would change in character, becoming more open due to localised scrub and hedge removal.

1.14.129 Two receptors, FP1 and T1, that would be affected by short term significant effects during construction would still be affected by the same level of significance of effect during the first winter after completion of the works, i.e.,

both would experience moderate adverse significance of effect in the short term.

1.14.130 Effects for all other visual receptors would not be significant.

Ty du

1.14.131 Following construction, users of the footpath FP1 adjacent to the west side of the site would continue to experience close views of the area cleared of scrub with fairly extensive open views across the site. Views would gradually soften as new vegetation became established through natural re-colonisation. This would give rise to a short-term small adverse magnitude of effect, with a moderate adverse significance of effect, which would be significant.

1.14.132 Receptor R1 would continue to be aware of the opened up views across site, with a small adverse magnitude of effect giving rise to a moderate adverse significance of effect.

1.14.133 Effects for all other visual receptors would not be significant.

Operation: summer year 15

Cae Canol-dydd

1.14.134 By the summer of Year 15 it is assumed topsoil storage stockpiles would have been removed (they should actually be removed within 3 years of placement) and grassland areas restored. In the long term, soil stripping areas would have revegetated with new fen vegetation established and loss of hedges and scrub would no longer be specifically noticeable. Any significant adverse visual effects would gradually reduce and by year 15 all visual effects are assessed as likely to be of negligible adverse magnitude, having a negligible significance of effect and not significant.

Cors Gwawr

1.14.135 By summer Year 15 it is assumed topsoil storage stockpiles would have been removed and grassland areas restored. In the long term, soil stripping areas would have revegetated and loss of hedges and scrub would no longer be specifically noticeable. Any significant adverse effects would gradually reduce and by year 15 are assessed as likely to be of negligible adverse magnitude, having a negligible significance of effect and not significant.

Ty du

1.14.136 At Ty du by the summer of Year 15 after the establishment of low intensity grazing, a natural mosaic of various types of natural vegetation would have developed and the site would visually appear re-integrated within the character of wider landscape setting. Subject to the intensity of grazing and any other management methods, there would be a high likelihood of some regrowth of natural scrub. The cleared area would no longer be apparent and the established mosaic of natural vegetation would be in keeping with the overall rural landscape pattern.

1.14.137 Any significant adverse visual effects would gradually reduce and by Year 15 any visual effects are assessed as likely to be of negligible adverse magnitude, having a negligible significance of effect, and therefore not significant.

Additional mitigation

1.14.138 No additional mitigation has been identified at this stage but further design development will be undertaken, as a result of which it may be possible to reduce the significance of some of the landscape and visual effects identified.

Residual effects

1.14.139 This section describes the residual effects having taken into account the embedded mitigation and good practice measures described above.

1.14.140 As no additional mitigation measures have been identified for the three sites, the residual effects for both construction and operation (winter year 1) would be the same. Construction works would be completed in the summer months, leaving little time for any significant growth before the first winter of wetland vegetation planted as part of the ecological habitat creation works, or of any growth from natural re-colonisation by native vegetation. The assessment of residual effects at operation (winter year 1) is therefore effectively assessing the newly completed site works, with the only difference being the absence of construction site equipment and machinery. For this reason, it is combined with the assessment of residual effects for construction.

1.14.141 The only exception to this is where there would be an experiential difference for receptors at Cae Canol-dydd, due to a footpath at this site being closed for construction and then reopened on completion of construction works.

1.14.142 A summary of residual effects for the separate sites is given below.

Cae Canol-dydd

1.14.143 During construction, two receptors, at this site, FP2 and R1 would experience moderate adverse, residual significance of effect in the short term.

1.14.144 During operation (winter year 1), the above two receptors plus an additional receptor, would experience moderate adverse effects. Thus altogether, during operation (winter year 1), three receptors at this site, FP1, FP2 and R1, would experience moderate adverse, residual significance of effect in the short term.

Cors Gwawr

1.14.145 During construction and operation (winter year 1), two receptors, at this site, FP1 and T1, would experience moderate adverse, residual significance of effect in the short term.

Ty du

1.14.146 At Ty du during construction and operation (winter year 1), two receptors at this site, FP1 and R1 would experience moderate adverse, residual significance of effect in the short term.

Summary of residual effects

1.14.147 In summary, the total number of visual receptors potentially experiencing residual effects during construction is six, with this total rising to seven at operation: winter year 1.

1.14.148 By operation (summer year 15) it is anticipated that the new wetland areas created by soil stripping would be effectively established and re-integrated with the existing landscape pattern. Soil stockpiles would have been removed and grassland re-established in their place.

1.14.149 The residual effect would be an overall loss of hedgerows, but in visual terms and in the context of the wider landscape pattern, this would be unlikely to be noticeable.

1.14.150 Therefore, at operation (summer year 15), no significant residual effects are anticipated for any landscape or visual receptors.

1.14.151 The assessment of residual effects and their significance for all three sites is provided in table 1-33 to table 1-35, below. The residual effects for construction and operation: winter year 1, are amalgamated in the following tables, for the reasons explained above.

1.14.152 Only significant effects are reported in the tables, so only visual effects are shown, and not all of the assessment years are reported. The complete set of landscape and visual effects, including those assessed as being of minor significance and upwards, for all assessment years, are reported in appendix I3-1 (Application Reference Number: 6.9.8). Effects considered to be of only negligible significance are not reported for any receptor.

Table 1-33 Cae Canol-dydd: residual effects for visual receptors

Receptor (or group of receptors)	Sensitivity 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 (winter year 1)								
FP1 Users of one footpath through site.	High	Footpath would be re-opened on completion of works with experience clear, close views of completed soil stripping and stockpiles contrasting with the natural landform. Removal of hedges would be apparent.	Adverse short-term	Medium adverse over short term (Size and Scale: medium Geographical Extent: Small)	Moderate adverse over short term Significant	None	Medium adverse over short term (Size and Scale: medium Geographical Extent: Small)	Moderate adverse over short term Significant
Construction and operation (winter year 1) (effects for each phase for remaining receptors considered very similar therefore assessed together to avoid repetition)								
FP 2 Users of two footpaths to southeast of site.	High	Receptors would experience clear views of construction works from	Adverse short-term	Medium adverse over short term (Size and Scale: medium	Moderate adverse over short term Significant	None	Medium adverse over short term (Size and Scale: medium	Moderate adverse over short term Significant

Receptor (or group of receptors)	Sensitivity 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
		ridgeline and fields outside site.		Geographical Extent: Small)			Geographical Extent: Small)	
R1 Residents of two properties at Merddyn-hafod to west of site on B5110.	High	Potential clear close views of proposed soil stockpile and machinery movements resulting in partial obstruction of the existing open and long distance views. Main area of soil stripping and hedge removal also likely to be visible.	Adverse short-term	Medium adverse over short term (Size and Scale: medium Geographical Extent: Small)	Moderate adverse over short term Significant	None	Medium adverse over short term (Size and Scale: medium Geographical Extent: Small)	Moderate adverse over short term Significant

Table 1-34 Cors Gwawr: residual effects for visual receptors

Receptor (or group of receptors)	Sensitivity 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 and operation (winter year 1)								

Receptor (or group of receptors)	Sensitivity 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
(effects for each phase considered very similar therefore assessed together to avoid repetition)								
FP 1 Users of two sections of footpath through site.	High	Receptors would experience direct, close views of soil stripping and hedge and scrub removal. (One section of the footpath would be likely to be closed during construction.)	Adverse short-term	Small adverse over short term (Size and Scale: Small Geographical Extent: Small)	Moderate adverse over short term Significant	None	Small adverse over short term (Size and Scale: Small Geographical Extent: Small)	Moderate adverse over short term Significant
T1 Users of lane to southeast edge of site.	Medium	Clear open views over open verge and low boundary hedge of works at southern end of site including scrub removal and construction of soil storage stockpiles. Non-naturalistic form of stockpiles	Adverse short-term	Medium adverse over short term (Size and Scale: Small Geographical Extent: medium)	Moderate adverse over short term Significant	None	Medium adverse over short term (Size and Scale: Small Geographical Extent: medium)	Moderate adverse over short term Significant

Receptor (or group of receptors)	Sensitivity 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
		would contrast adversely with natural gentle gradients of local landform. Views possible along length of route of removal of hedges and soil stripping.						

Table 1-35 Ty du: residual effects for visual receptors

Receptor (or group of receptors)	Sensitivity 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 and operation (winter year 1) (effects for each phase considered very similar therefore assessed together to avoid repetition)								
FP 1 Users of one footpath through site.	High	There would be close views of scrub clearance activities and burning of arisings with progressive opening up of views across the site	Adverse short-term	Small adverse over short term (Size and Scale: Small Geographical Extent: Small)	Moderate adverse over short term Significant	None	Small adverse over short term (Size and Scale: Small Geographical Extent: Small)	Moderate adverse over short term Significant
R1 Residents to east of site: one property: Ty du	High	Potential clear views towards site from farm house. Site partially concealed in shallow valley.	Adverse short-term	Small adverse over short term (Size and Scale: small Geographical Extent: Small)	Moderate adverse over short term Significant	None	Small adverse over short term (Size and Scale: small Geographical Extent: Small)	Moderate adverse over short term Significant

Receptor (or group of receptors)	Sensitivity 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
		Possible clear views of scrub clearance work and burning of arisings forming a part of wider views.						

1.15 Cultural heritage

Study areas

1.15.2 The study areas for archaeological remains, historic buildings and the historic landscape were defined as 1km areas extending from the site boundaries of each of the three Ecological Compensation Sites. This size of study area was used as it provided sufficient information to inform the assessment of the value of heritage assets and was considered proportionate to the potential effects that may result from the construction and operation of each of the Ecological Compensation Sites.

1.15.3 As visual and noise effects would diminish with distance, there are unlikely to be any significant effects on the setting of designated assets beyond 1km and therefore any designated heritage assets which may be affected by the construction and operation of the three Ecological Compensation Sites would fall within the 1km study areas.

Baseline environment

1.15.4 The cultural heritage baseline environment has been established through the following sources of information.

- Historic Environment Record (HER) records available online for information on archaeological remains and historic buildings [RD40].
- Coflein for information about the historic environment of Wales from the Royal Commission on the Ancient and Historical Monuments of Wales [RD41].
- Cof of Cymru for designated assets within and around the study area, including World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens of Special Historic Interest, and Registered Historic Landscapes [RD42].
- Historic mapping held in the Map Library of the National Library of Scotland [RD43]. Map regression has been undertaken to identify those historic buildings located within the study areas for each of the Ecological Compensation Sites which were shown on the first edition 6” Ordnance Survey map and remain extant today.
- LiDAR data [RD44].
- LANDMAP for information on landscape classifications [RD45].
- For baseline information for Ty du: Appendix D11-1 (Wylfa Newydd Proposed New Nuclear Power Station Cultural Heritage Baseline Assessment Report) (Application Reference Number 6.4.68).

1.15.5 These sources were considered to provide a sufficient basis for the assessment of the value of heritage assets with the study areas for the three Ecological Compensation Sites.

Cae Canol-dydd

1.15.6 From the sources identified in paragraph 1.15.4, a total of 69 heritage assets are considered as part of the cultural heritage baseline for Cae Canol-dydd, comprising seven archaeological remains, 58 historic buildings, and four Historic Landscape Types (HLT). The locations of these heritage assets are shown on figure 21. A summary of the value of the 69 heritage assets considered is presented in table 1-36.

Table 1-36 Summary of the value of heritage assets (Cae Canol-dydd)

Subtopic	High	Medium	Low	Negligible
Archaeological remains	0	5	0	2
Historic buildings	0	4	48	6
Historic Landscape Types	1	3	0	0
TOTAL	1	12	48	8

1.15.7 No Scheduled Monuments or Grade I or Grade II* Listed Buildings were identified within the study area for Cae Canol-dydd. Assets assessed to be of medium value include four Grade II Listed Buildings: Melin Llanddyfnan (Asset 10), Lofted stable range at Plas Llanddfnan (Asset 11), Plas Llanddyfnan (Asset 12) and Hendre Howell (Asset 13).

Archaeological remains

Archaeological remains of high value

1.15.8 No archaeological remains assessed to be of high value have been identified within the study area for Cae Canol-dydd.

Archaeological remains of medium value

1.15.9 Burnt Mound, S of Pen y Fan Gosaf (Asset 15) comprises an area of burnt, fractured stone with a linear slot to its eastern limit, possibly used to carry water. While an earlier Mesolithic flint was recovered from within the deposit, the burnt mound itself is thought to date from the Bronze Age. The most commonly suggested function for these features is that they were used to heat water and/or to create steam for cooking or bathing and, while burnt mounds are not as rare as previously thought, they are characteristic of Bronze Age activity in the region. In consideration its potential to contribute to research objectives related to prehistoric activity on Anglesey [RD40]; [RD41], Asset 15 has been assessed to be of medium value.

1.15.10 Burial Chamber, Possible Site of, Llanddyfnan (Asset 18) is the possible site of a chambered tomb. While the burial chamber may have been destroyed and its exact location is not known, any surviving remains have the potential to contribute to research objectives relating to prehistoric funerary practices

[RD40]; [RD41] and therefore Asset 18 has been assessed to be of medium value.

1.15.11 Three further archaeological remains have been assessed to be of medium value: Circular Cropmark, Hendre Hywel (Asset 2), Feature, Possible, Ty'n Beudy (Asset 17) and Possible Feature, South-west of Tyn Beudy (Asset 23). These assets features were identified in the HER or using publically accessible LiDAR data [RD43] and have the potential to contribute to research objectives related to prehistoric activity on Anglesey [RD40]; [RD41] and have therefore been assessed to be of medium value.

Archaeological remains of low value

1.15.12 No archaeological remains assessed to be of low value have been identified within the study area for Cae Canol-dydd.

Archaeological remains of negligible value

1.15.13 Two findspots: a carved stone block (Asset 20) and a medieval stone mortar (Asset 22), were identified within the study area for Cae Canol-dydd. As these assets represent unstratified artefacts that have since been removed, Assets 20 and 22 have been assessed to be of negligible value.

Potential for unknown archaeological remains

1.15.14 While there are no known archaeological remains within the Cae Canol-dydd site, the site has not been previously developed or extensively farmed and archaeological remains have been identified in adjacent areas. Therefore, the potential for the presence of unknown archaeological remains within the Cae Canol-dydd site has been assessed to be moderate.

Historic buildings

Historic buildings of high value

1.15.15 No historic buildings assessed to be of high value have been identified within the study area for Cae Canol-dydd.

Historic buildings of medium value

1.15.16 Melin Llanddyfnan (Asset 10) is a substantially intact three-storey windmill designated a Grade II Listed Building. While in the 19th century there were over 40 windmills operating on Anglesey, Melin Llanddyfnan (Asset 10) is one of only 18 now surviving. In consideration of this and its designation, Asset 10 has been assessed to be of medium value.

1.15.17 Two gentry houses; Plas Llanddyfnan (Asset 12) and Hendre Howell (Asset 13) were identified within the study area for Cae Canol-dydd. Dating from the 16th century, Asset 12 retains the character and detail of its 18th century remodelling as well as some original features and is designated a Grade II Listed Building. This heritage asset's relationship with the adjacent designated stable range (Lofted stable range at Plas Llanddfnan (Asset 11), Grade II Listed Building) and other historic garden features (see Assets 16 and 24; low value, see below) contributes to our understanding of it as part of a small post-medieval estate. Hendre Howell (Asset 13) is a late 17th

century example designated a Grade II Listed Building for its original vernacular character and features. In consideration of their designations, Assets 11, 12 and 13 have been assessed to be of medium value.

Historic buildings of low value

1.15.18 Two post-medieval chapels; Capel Cefn-iwrch, Llanddyfnan (Asset 14) and Capel Ebenezer, Rosmeirch (Asset 21), were identified within the study area for Cae Canol-dydd. Assets 14 and 21 comprise post-medieval chapels representative of non-conformist activity and are a common asset type in the region and Asset 21 is the site of the oldest non-conformist chapel on Anglesey. Built in 1749 on the site of the current graveyard the one-storey, the original thatched chapel was replaced with the current 19th century building. Chapel of this type are not rare, but in consideration of their historic interest, Assets 14 and 21 have therefore been assessed to be of low value.

1.15.19 Based on information from the HER and RCAHMW, as a site inspection has not been undertaken, Cae Canol-dydd; Walled Garden, SW of Plas-Llanddyfnan (Asset 16) and Plas-Llanddyfnan, Garden, Llanddyfnan (Asset 24) have been identified as the possible sites of historic garden buildings and features associated with Plas Llanddyfnan (Asset 11; medium value). In consideration of their remaining historic fabric and relationship with Plas Llanddyfnan (Asset 11), Assets 16 and 24 have been assessed to be of low value.

1.15.20 The remaining 44 historic buildings are characterised by agricultural and domestic buildings identified on the first edition 6" Ordnance Survey map and remain extant today. While these buildings contribute to our understanding of the post-medieval landscape on Anglesey at a local level, they are not rare and have been modified therefore these assets been assessed to be of low value.

Historic buildings of negligible value

1.15.21 A total of six historic buildings have been assessed to be of negligible value in the study area for Cae Canol-dydd. These comprise buildings identified on the first edition 6" Ordnance Survey map and that are still extant today. However, based on information from the sources identified above, these appear to have been subject to substantial modification and alteration such that any remaining historic interest has been lost.

Historic landscape types

Historic landscape types of high value

1.15.22 Fieldscape, Central Eastern Mon (HLT 2) is a large rural area that occupies most of inland Isle of Anglesey. Eleven important hedgerows, as defined under The Hedgerows Regulations 1997 have been identified within the Cae Canol-dydd site. Please refer to chapter B11 (cultural heritage) (Application Reference Number: 6.2.11) for more information on The Hedgerows Regulations 1997. LANDMAP identifies HLT 2 to be of outstanding national value as a broad landscape containing many disparate patterns which

illustrate and exemplify Anglesey's evolution as a primarily rural area. HLT 2 has therefore been assessed to be of high value.

Historic landscape types of medium value

1.15.23 HLT 1 comprises the settlement of Talwrn characterised by post-medieval buildings surrounded by small, regular fields, however evidence of occupation dating from the early prehistoric period has been identified in the area. LANDMAP identifies Talwrn (HLT 1) to be of county value as a good example of a small, non-nucleated post-medieval settlement on Anglesey with evidence of prehistoric occupation. HLT 1 has therefore been assessed to be of medium value.

1.15.24 Fieldscape, Tre-Ysgawen (HLT 3) and Fieldscape, Eastern Mon (HLT 4) are large areas of Anglesey's rural landscape. HLT 3 is an area of 18th to 19th estate parkland overlying an earlier fieldscape, while HLT 4 is characterised by a 'tightly-knit' rural landscape with clusters of nucleated settlements and small irregular fields used for arable farming. LANDMAP identified both HLTs to be of county value and therefore they have been assessed to be of medium value.

Historic landscape types of low and negligible value

1.15.25 No HLTs assessed to be of low or negligible value have been identified within the study area for Cae Canol-dydd.

Cors Gwawr

1.15.26 From the sources identified in paragraph 1.15.4, a total of 81 heritage assets are considered as part of the cultural heritage baseline for Cors Gwawr, comprising 13 archaeological remains, 65 historic buildings, and three HLTs. The locations of these heritage assets are shown on figure 22. A summary of the value of these heritage assets is presented in table 1-37.

Table 1-37 Summary of the value of heritage assets (Cors Gwawr)

Subtopic	High	Medium	Low	Negligible
Archaeological remains	0	7	2	4
Historic buildings	0	5	57	3
Historic Landscape Types	1	2	0	0
TOTAL	1	14	60	6

1.15.27 No Scheduled Monuments or Grade I or Grade II* Listed Buildings were identified within the study area for Cors Gwawr. Assets assessed to be of medium value include five Grade II Listed Buildings; Church of St Ffinan (Asset 1), Sundial in churchyard of Church of St Ffinan (Asset 2), Parc (Asset 13), Bryn Brochan (Asset 14) and Bodeilio House, Llanddyfnan (Asset 20).

Archaeological remains

Archaeological remains of high value

1.15.28 No archaeological remains assessed to be of high value have been identified within the study area for Cors Gwawr.

Archaeological remains of medium value

1.15.29 Hut Circles, Cefn Poeth Bach (Asset 6) comprises at least three small hut-circles, however there is the potential for unknown archaeological remains to be present and for the site to be more extensive than previously thought. Hut Group, Llanddyfnan (Asset 22) is the site of an enclosure with some huts discernible in the interior, along with the remains of possible stone walls to the east and west of the enclosure. In consideration of their potential to contribute to research objectives relating to prehistoric activity on Anglesey [RD40]; [RD41]; [RD42], and their rarity, Assets 6 and 22 have been assessed to be of medium value.

1.15.30 Tan-y-Graig Hillfort (Asset 8) is the remains of a prehistoric walled fort on the summit of a craggy outcrop. Another possible hillfort (Asset 10) has been identified nearby, with a perimeter bank and possible hut-circles in the area, however this has been interpreted as a possible settlement rather than a defensive fortification. While both sites are in relatively poor condition, but in consideration of their rarity and potential to contribute to research frameworks related to prehistoric settlement on Anglesey [RD40]; [RD41]; [RD42], Assets 8 and 10 have been assessed to be of medium value.

1.15.31 Three further archaeological remains have been assessed to be of medium value; Circular Cropmark, Hendre Hywel (Asset 19), Circular Feature, Possible, Tan-y-graig (Asset 68) and Circular Feature, East of Pen-y-bryn (Asset 69). These assets are features identified from aerial photography or

publically accessible LiDAR data [RD43] and have the potential to contribute to our understanding of prehistoric Anglesey.

Archaeological remains of low value

1.15.32 Burial Chamber, Site of, Bodeilio, Llanddyfnan (Asset 12) is the possible site of a destroyed cromlech, or chambered tomb. While this site may have the potential to contribute to our understanding of prehistoric funerary rites, the site is known only from historic field name evidence and local tradition and is believed to be completely destroyed. In consideration of this, Asset 12 has been assessed to be of low value.

1.15.33 Site of Burial Ground, W of Talwrn (Asset 18) is the possible site of a prehistoric burial ground identified in the deeds of the nearby farm. This field is identified as unploughable in the deeds due to the potential burial ground, however this may be due to its natural topography rather than the presence of any buried remains. Given any potential burials could contribute to our understanding of prehistoric burial practices on Anglesey, but in consideration of this asset potential to be natural topography, Asset 18 has been assessed to be of low value.

Archaeological remains of negligible value

1.15.34 Bodeilio, Reused Medieval Gravestone (Asset 21) was identified as part of the paving to the farmhouse at Bodeilio (Asset 20, see below). The two halves of the gravestone once bore an incised cross and are estimated to be of 12th or 13th century date however both halves are now in poor condition. While this asset comprises a gravestone of medieval date, it is out of context and is in poor condition therefore Asset 21 has been assessed to be of negligible value.

1.15.35 Two findspots; Token, Possible, Findspot, Dyffryn (Asset 3) and Bronze Tool (Axe), Findspot, Ynys Talwrn (Asset 11), were identified within the study area for Cors Gwawr. As these assets represent unstratified artefacts that have since been removed, Assets 3 and 11 have been assessed to be of negligible value.

1.15.36 Railway Embankment, North-West of Dyffryn (Asset 4) is the remains of a disused railway embankment identified using historic mapping. Given this asset can contribute little to our understanding of the alignment and construction of the historic railway, Asset 4 has been assessed to be of low value.

Potential for unknown archaeological remains

1.15.37 While there are no known archaeological sites within the Cors Gwawr site, the site has not been previously developed or extensively farmed and archaeological remains have been identified in adjacent areas. Therefore, the potential for the presence of unknown archaeological remains within the Cors Gwawr site has been assessed to be moderate.

Historic buildings

Historic buildings of high value

1.15.38 No historic buildings assessed to be of high value have been identified within the study area for Cors Gwawr.

Historic buildings of medium value

1.15.39 The Church of St Ffinan (Asset 1) is a simple Romanesque revival-style church built by John Welch in 1841. This asset is possibly on the site of an earlier 13th century church and forms a group with the adjacent sundial (Asset 2). The Sundial in churchyard of Church of St Ffinan (Asset 2) comprises a 19th century bronze sundial on a stone pier, possibly from an earlier church. Both assets are designated Grade II Listed Buildings. In consideration of their designations, Assets 1 and 2 have been assessed to be of medium value.

1.15.40 Two traditional post-medieval small-holdings (Assets 13 and 14) are designated as Grade II Listed Buildings. Parc (Asset 13) is an intact 19th century small-holding with associated agricultural buildings, retaining much of its internal arrangement. Similarly, Bryn Brochan (Asset 14) retains much of its original vernacular character. In consideration of their designation, Assets 13 and 14 have been assessed to be of medium value.

1.15.41 Bodeilio House, Llanddyfnan (Asset 20) comprises a two-storey limestone and grit rubble house, designated as a Grade II Listed Building. Dating from the 17th century, Asset 20 has been subject to some modernisation and alteration, however much of its original fabric, including an inscribed date stone above the first-floor window, remains. In consideration of its designation, Asset 20 has been assessed to be of medium value.

Historic buildings of low value

1.15.42 Four religious buildings assessed to be of low value were identified in the study area for Cors Gwawr. Sunday School, N of Glan-yr-afon (Asset 5) is a Sunday school identified on historic mapping, Talwrn, Llanddyfnan (Asset 7) and Siloam, Llanddyfnan (Asset 15) are both post-medieval non-conformist chapels, St Deiniol's Church, Talwrn (Asset 17) is a 19th century church. Given their limited rarity, but in consideration of their historic interest, Assets 5, 7, 15 and 17 have been assessed to be of low value.

1.15.43 Tan-y-Graig Hall (Asset 9) is a post-medieval house, and Bodlondeg, Garden, Talwrn (Asset 16) is the site of a garden, including woodland and a conservatory, depicted on historic mapping. In consideration of their remaining historic fabric, Asset 9 and 16 have been assessed to be of low value.

1.15.44 The remaining 51 historic buildings are characterised by agricultural, domestic and public buildings identified on the first edition 6” Ordnance Survey map and remain extant today. While these buildings contribute to our understanding of the post-medieval landscape on Anglesey at a local level, they are of a common type and have been modified therefore these assets been assessed to be of low value.

Historic buildings of negligible value

1.15.45 Nyth-glŷd (Asset 41), Ty'n-lôn (Asset 45) and Pant-y-morfil (Asset 71) are buildings identified on the first edition 6" Ordnance Survey map. While the value of these assets is derived from their surviving historic fabric, they have been subject to substantial modernisation and alteration. In consideration of this, and this asset type's limited rarity, Assets 42, 46 and 73 have been assessed to be of negligible value.

Historic landscape types

Historic landscape types of high value

1.15.46 Fieldscape, Central Eastern Mon (HLT 3) is a large rural area that occupies most of inland Anglesey. LANDMAP identifies HLT 3 to be of outstanding national value as a broad landscape containing many disparate patterns which illustrate and exemplify Anglesey's evolution as a primarily rural area. HLT 3 has therefore been assessed to be of high value.

Historic landscape types of medium value

1.15.47 Fieldscape, Plas Gwyn (HLT 1) comprises an area centred around an 18th century house and gardens. HLT 1 is characterised by designed landscape features, wooded areas and parkland surrounded by woodland belts. Within the Cors Gwawr site, five important hedgerows, as defined under The Hedgerows Regulations 1997 have been identified as elements of HLT 1. Please refer to chapter B11 (Application Reference Number: 6.2.11) for more information on The Hedgerows Regulations 1997. LANDMAP identifies HLT 1 to be of regional value as an 18th century house and gardens which retain much of their original style and atmosphere. HLT 1 has therefore been assessed to be of medium value.

1.15.48 HLT 2 comprises the settlement of Talwrn characterised by post-medieval buildings surrounded by small, regular fields, however evidence of occupation dating from the early prehistoric period has been identified in the area. Within the Cors Gwawr site, two important hedgerows, as defined under The Hedgerows Regulations 1997 have been identified as elements of HLT 2. Please refer to chapter B11 (Application Reference Number: 6.2.11) for more information on The Hedgerows Regulations 1997. LANDMAP identifies Talwrn (HLT 2) to be of county value as a good example of a small, non-nucleated post-medieval settlement on Anglesey with evidence of prehistoric occupation. HLT 2 has therefore been assessed to be of medium value.

Historic landscape types of low and negligible value

1.15.49 No HLTs assessed to be of low or negligible value have been identified within the study area for Cors Gwawr.

Ty du

1.15.50 A total of 53 heritage assets are considered as part of the cultural heritage baseline for Ty du, comprising 22 archaeological remains, 29 historic buildings, and two HLTs. The locations of these heritage assets are shown

on figure 23. A summary of the value of these heritage assets is presented in table 1-38.

Table 1-38 Summary of the value of heritage assets (Ty du)

Subtopic	High	Medium	Low	Negligible
Archaeological remains	5	11	6	0
Historic buildings	13	1	13	2
Historic Landscape Types	0	2	0	0
TOTAL	18	14	19	2

1.15.51 Assets assessed to be of high value include 14 Scheduled Monuments. No Grade I, Grade II* or Grade II Listed Buildings were identified within the study area for Ty du.

Archaeological remains

Archaeological remains of high value

1.15.52 Dias Gyfor Promontory Fort (Asset 1) is an Iron Age fort, designated a Scheduled Monument. In consideration of its designation, and its potential to contribute to research objectives relating to defended Iron Age and Romano-British sites [RD40]; [RD42], Asset 1 has been assessed to be of high value.

1.15.53 Silica Brick Works, Porth Wen (Asset 13), a Scheduled Monument, dates from the turn of the 20th century and comprises the brickworks and associated remains and structures including winding gear (Asset 11), a crane (Asset 27) and loading quay (Asset 28), all Scheduled Monuments. In consideration of their designations, Assets 11, 13, 27 and 28 have been assessed to be of high value.

Archaeological remains of medium value

1.15.54 Archaeological remains evidencing prehistoric settlement activity in the study area is characterised by two hut circles and an enclosure; Possible Hut Circle, Porth Adfan (Asset 4) and Hut Circle (Possible), Enclosure, Graig Wen (Asset 25) and Enclosure, South-west of Rhos-isaf (Asset 37), while Orthostatic Wall, Porth Wen (Asset 18) comprises the remains of an enclosure wall, possibly associated with Hut Circle (Possible) and Enclosure, Graig Wen (Asset 25). In consideration of their potential to contribute to research objectives related to prehistoric activity settlement [RD40]; [RD41]; [RD42], Assets 4, 18, 25 and 37 have been assessed to be of medium value.

1.15.55 Cist Burial, Llanlleiana (Asset 23) and Long Cist Burials, Peibron Farm, Amlwch (Asset 35) comprise stone lined graves containing burials of potentially early medieval date, although this type of burial is also common to the Bronze Age. In consideration of their possible contribution to research

objectives related to medieval burial practices [RD44]; [RD45], Assets 23 and 35 have been assessed to be of medium value.

1.15.56 Chapel, Llanlleiana (Asset 2) and Capel Gwen Hir (Hoyw), Site of, Llanbadrig (Asset 36) comprise the sites of chapels of possible medieval date. While these assets have some potential to contribute to research objectives related to the medieval period [RD44]; [RD45], due to their poor preservation, Assets 2 and 36 have been assessed to be of medium value.

1.15.57 Castell (Site of) Porth Wen, Amlwch (Asset 32) comprises placename evidence for a possible small fortified site. While there is no physical evidence of any artificial fortification in the area, this asset has the potential to indicate the presence of archaeological remains and therefore has been assessed to be of medium value.

1.15.58 Assets 5 and 7 are quarries associated with the Porth Wen Brick Works (Asset 13; high value). While quarries such as these are not rare, in consideration of their group value with the Scheduled Monument, Assets 5 and 7 have been assessed to be of medium value.

Archaeological remains of low value

1.15.59 A total of six archaeological remains have been assessed to be of low value in the study area for Ty du.

1.15.60 Archaeological remains associated with the sea (Landing Place, Porth Wen (Asset 8), Flagstaff, Porth Y Castell (Asset 29) and Boathouse, Porth Y Castell (Asset 31)), industrial sites relating to Anglesey's local and commercial extractive and mining industries (Porth Llanlleiana, Reservoir Pond and Leat (Asset 3) and Bryn Llewelyn Mine (Asset 24)) and remains associated with local post-medieval agricultural practices (Banks, Rhyd y Groes (Asset 38)). While assets such as these are not rare, they can contribute to our understanding of the post-medieval local landscape and therefore have been assessed to be of low value.

Archaeological remains of negligible value

1.15.61 No archaeological remains assessed to be of negligible value have been identified within the study area for Ty du.

Potential for unknown archaeological remains

1.15.62 While there are no known archaeological sites within the Ty du site, the site has not been previously developed or extensively farmed and archaeological remains have been identified in adjacent areas. Therefore, the potential for the presence of unknown archaeological remains within the study area for Ty du has been assessed to be moderate.

Historic buildings

Historic buildings of high value

1.15.63 A total of thirteen historic buildings have been assessed to be of high value in the study area for Ty du. These comprise structures and buildings associated with the Porth Wen Brick Works (Asset 13; high value; see above)

including kilns (Assets 17, 22 and 26), chimneys (Assets 12 and 20) and industrial buildings (Assets 6, 10, 14, 15, 16 and 19). The majority of these assets are designated as Scheduled Monuments. In consideration of this and their association with Porth Wen Brick Works, these assets have been assessed to be of high value.

Historic buildings of medium value

1.15.64 Leper House, Rhyd Y Clafdy, Cemaes (Asset 34) is a probably Lazar house, east of Cemaes. In consideration of its historic interest, Asset 34 has been assessed to be of medium value.

Historic buildings of low value

1.15.65 A total of thirteen historic buildings have been assessed to be of low value comprising: Capel Moriah, Porth Wen (Asset 30), Limekiln, Porth y Castell (Asset 33) and eleven historic buildings identified on the first edition 6" Ordnance Survey map and remain extant today. While these buildings contribute to our understanding of the post-medieval landscape on Anglesey at a local level, they are of a common type and have been modified therefore these assets been assessed to be of low value.

Historic landscape types

Historic landscape types of high value

1.15.66 No HLTs assessed to be of high value have been identified within the study area for Ty du.

Historic landscape types of medium value

1.15.67 Two HLTs have been assessed to be of medium value in the study area for Ty du. Fieldscape, Rhosbeirio (HLT 1) comprises a gently-rolling inland area of large enclosed fields and North Coast, Mon (HLT 2) comprises a coastal area characterised by remote rocky outcrops, scattered settlements and irregular fields. Within the Ty du site, two important hedgerows, as defined under The Hedgerows Regulations 1997 have been identified as elements of HLT 2. Please refer to chapter B11 (Application Reference Number: 6.2.11) for more information on The Hedgerows Regulations 1997. LANDMAP identifies HLT 1 to be of county value as an area of gently rolling rural fields and farms inland from the coast and HLT 2 of regional value as a very distinctive coastal area. HLTs 1 and 2 have therefore been assessed to be of medium value.

Historic landscape types of low and negligible value

1.15.68 No HLTs assessed to be of low or negligible value have been identified within the study area for Ty du.

Design basis and activities

1.15.69 The assessment is based on the description of the proposed development set out in section 1.2 of this appendix and the further detail provided in appendix D9-24 (Application Reference Number: 6.4.57). This section 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. A worst case scenario has been assessed from a cultural heritage perspective based on the description of the proposed development and the assumptions outlined below.

1.15.70 For the three Ecological Compensation Sites, the cultural heritage baselines that informed the assessment were established through a desk-based survey only.

1.15.71 Construction activities, especially the removal of topsoil, have the potential to remove any unknown archaeological remains that may be present within any previously undisturbed areas of the three Ecological Compensation Sites. It is assumed that unknown remains, if present, are of the same nature and value as those previously identified in the adjacent areas.

Assessment of effects

1.15.72 This section presents the findings of the assessment of effects associated with the construction and operation of the three Ecological Compensation Sites. As none of the effects are likely to be significant a short summary is provided below.

Construction

Cae Canol-Dydd

1.15.73 No effects on the seven archaeological remains within the study area are predicted as a result of the construction for Cae Canol-Dydd.

1.15.74 There is the potential that any unknown archaeological remains that may be present within the Cae Canol-Dydd site would be removed by construction.

1.15.75 No effects on historic buildings have been assessed to be of moderate adverse significance or above. No effects of minor adverse significance are predicted. Effects of negligible adverse significance are predicted for eight historic buildings; these effects are discussed below. No effects are predicted on the remaining 61 historic buildings.

1.15.76 While construction activities would be visible in views southwest of Melin Llanddyfnan (Asset 10; medium value), they would form a small intrusion into the wide-ranging views from this asset and would not detract from its prominence in the landscape. The magnitude of this short-term effect has been assessed to be negligible and the significance of effect negligible adverse.

1.15.77 While construction activities such as the creation of access tracks, topsoil stripping and the creation of spoil mounds may be visible from Assets 34, 53, 56, 59, 60 and 61 (low value), these would be limited by existing buildings, established vegetation and topography. The historic fabric of these assets would not be affected by construction activities. The magnitude of these short-term effects has been assessed to be negligible and the significance of effect negligible adverse.

1.15.78 Construction activities such as the creation of access tracks and a site compound, topsoil stripping and the creation of a spoil mound would result in visual intrusion into the setting of Merddyn-hafod (Asset 54; negligible value). As this asset's value is derived primarily from its historic fabric rather than its setting the magnitude of this short-term effect has been assessed to be small and the significance of effect negligible adverse.

1.15.79 No effects on any HLTs have been assessed to be of moderate adverse significance or above. An effect on one HLT (Fieldscape, central eastern Mon (HLT 2); high value) has been assessed to be of minor adverse significance, this effect is discussed below. No effects are predicted on the remaining three HLTs.

1.15.80 While construction activities would change the character of a small area of Fieldscape, central eastern Mon (HLT 2) by altering the topography and removing historic landscape elements, given the size of this HLT as a whole this would not affect our understanding of the HLT as a rural landscape. The magnitude of this short-term effect has been assessed to be negligible and the significance of effect minor adverse.

Cors Gwawr

1.15.81 No effects on the 13 archaeological remains within the study area are predicted as a result of the construction for Cors Gwawr.

1.15.82 There is the potential that any unknown archaeological remains that may be present within the Cors Gwawr site would be removed by construction.

1.15.83 No effects on historic buildings have been assessed to be of moderate adverse significance or above. No effects of minor adverse significance are predicted. Effects of negligible adverse significance are predicted for seven historic buildings; these effects are discussed below. No effects are predicted on the remaining 58 historic buildings.

1.15.84 Construction activities such as the creation of access tracks, topsoil stripping and landscaping, and the establishment of site compounds would be visible from Assets 31, 32, 38, 48, 52, 57 and 61 (all low value). As the value of these historic buildings is derived from their historic fabric rather than their setting, the magnitude of these short-term effects has been assessed to be negligible and the significance of effect negligible adverse.

1.15.85 No effects on any HLTs have been assessed to be of moderate adverse significance of above. Effects on two HLTs (Talwrn (HLT 2); medium value and Fieldscape, central eastern Mon (HLT 3); high value) have been assessed to be of minor adverse significance, and these effects are discussed below. No effects are predicted on the remaining HLT.

1.15.86 Construction activities would change the character of Talwrn (HLT 2) by altering the topography and removing historic landscape elements. However, while historic landscape elements would be removed, these activities would not affect our understanding of this HLT as a small, non-nucleated post-medieval settlement. The magnitude of this short-term effect has been assessed to be small and the significance of effect minor adverse.

1.15.87 Construction activities would temporarily change the character of a small area of Fieldscape, central eastern Mon (HLT 3) by altering the topography and removing historic landscape elements. However, given the size of the HLT as a whole this would not affect our understanding of the HLT as a rural landscape. The magnitude of this short-term effect has been assessed to be small and the significance of effect minor adverse.

Ty du

1.15.88 No effects on the 21 archaeological remains within the study area are predicted as a result of the construction for Ty du.

1.15.89 There is the potential that any unknown archaeological remains that may be present within the Ty du site would be removed by construction.

1.15.90 No effects on historic buildings have been assessed to be of moderate adverse significance or above. Effects of minor adverse significance are predicted for four historic buildings and effects of negligible adverse significance are predicted for two historic buildings; these effects are discussed below. No effects are predicted on the remaining 24 historic buildings.

1.15.91 Construction activities may be visible to the east of Leper House, Rhyd Y Clafdy, Cemaes (Asset 34; medium value) however views would be filtered by the local topography and vegetation and the remote character of this asset's setting would remain essentially unchanged. The magnitude of these short-term effects has been assessed to be negligible and the significance of effect negligible adverse.

1.15.92 While construction activities may be visible in views to the southeast of Capel Moriah, Porth Wen (Asset 30; low value), they would be filtered by the undulating local topography and intervening buildings. The magnitude of these short-term effects has been assessed to be negligible and the significance of effect negligible adverse. Construction activities including fencing, access track creation and scrub clearance would be visible in views from Assets 41, 42, 43 and 49 (low value). As the value of these historic buildings is derived primarily from their remaining historic fabric rather that their setting, the magnitude of these short-term effects has been assessed to be small and the significance of effect minor adverse.

1.15.93 No effects on any HLTs have been assessed to be of moderate adverse significance of above. One effect on North Coast, Mon (HLT 2; medium value) has been assessed to be of minor adverse significance, this effect is discussed below. No effects are predicted on the remaining HLT.

1.15.94 Construction activities would change the character of a small area of North Coast, Mon (HLT 2) by altering the topography and removing historic landscape elements. However, while these activities would remove historic elements of the landscape this would not affect our understanding of this HLT as a distinctive coastal area. The magnitude of this short-term effect has been assessed to be small and the significance of effect minor adverse.

Operation

Cae Canol-dydd

1.15.95 No effects on the seven archaeological remains within the study area are predicted as a result of the operation of Cae Canol-dydd.

1.15.96 No effects on historic buildings have been assessed to be of moderate adverse significance or above. No effects of minor adverse significance are predicted. Effects of negligible adverse significance are predicted for three historic buildings; these effects are discussed below. No effects are predicted on the remaining 66 historic buildings.

1.15.97 While the spoil storage mounds would continue to be visible from Assets 53, 54 and 60 (low value) during operation, the historic fabric from which their value is derived would not be affected. The magnitude of these medium-term effects have been assessed to be negligible and the significance of effect negligible adverse.

1.15.98 No effects on the four HLTs within the study area are predicted as a result of the operation of Cae Canol-dydd.

Cors Gwawr

1.15.99 No effects on the 13 archaeological remains within the study area are predicted as a result of the operation of Cors Gwawr.

1.15.100 No effects on historic buildings have been assessed to be of moderate adverse significance or above. No effects of minor adverse significance are predicted. Effects of negligible adverse significance are predicted for five historic buildings; these effects are discussed below. No effects are predicted on the remaining 60 historic buildings.

1.15.101 While the spoil storage mounds would continue to be visible from Assets 38, 48, 52, 57 and 61 (low value) during operation, the historic fabric from which their value is derived would not be affected. The magnitude of these permanent effects has been assessed to be negligible and the significance of effect negligible adverse.

1.15.102 No effects on the four HLTs within the study area are predicted as a result of the operation of Cors Gwawr.

Ty du

1.15.103 No effects on the 21 archaeological remains, 30 historic buildings or two HLTs within the study area are predicted as a result of the operation of Ty du.

Additional mitigation

1.15.104 No additional mitigation for known archaeological remains or historic buildings is required for the construction or operation of the three Ecological Compensation Sites.

1.15.105 Unknown archaeological remains would be assessed and managed in accordance with section 12 of the Wylfa Newydd CoCP (Application Reference Number: 8.6).

1.15.106 Archaeological recording would be undertaken in accordance with relevant guidance provided by the Chartered Institute for Archaeologists (e.g. [RD46]) and Written Schemes of Investigation which would be agreed with Gwynedd Archaeological Planning Service (GAPS). All archaeological recording would include a programme of assessment, reporting, analysis, publication and dissemination commensurate with the value of the archaeological remains removed, submission of reports to the Historic Environment Record and National Monument Record of Wales, and the preparation of an ordered archive which would be submitted to an appropriate repository.

1.15.107 A photographic survey would be undertaken to record the current condition of the following HLTs:

- For Cae Canol-dydd: Fieldscape, central eastern Mon (HLT 2);
- For Cors Gwawr: Talwrn (HLT 2) and Fieldscape, central eastern Mon (HLT 3); and
- For Ty du: North Coast, Mon (HLT 2).

1.15.108 Photographic survey would be undertaken in accordance with relevant best practice guidance (e.g. [RD47]; [RD48]) and a Written Schemes of Investigation which would be agreed with GAPS. Photographic survey would include the preparation and submission of reports to the Historic Environment Record and National Monument Record of Wales and the preparation of an ordered archive which would be submitted to an appropriate repository.

1.15.109 A level 2 landscape survey would be undertaken to record the important hedgerows to be removed from each of the three Ecological Conservation Sites. Level 2 historic landscape survey would be undertaken in accordance with guidance provided by *Understanding the Archaeology of Landscapes, a guide to good recording practice* [RD47]. Historic landscape survey to Level 2 standards comprises a basic, accurate, descriptive and interpretive record of a landscape based on the results of field investigation.

1.15.110 A summary of proposed additional mitigation measures for cultural heritage is presented in table 1-39.

Table 1-39 Additional mitigation measures – construction

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
Photographic survey	To make record of any of the current condition of the historic landscape prior to construction	Completion of reporting, dissemination of results, and submission of an ordered archive to an appropriate repository
Level 2 Landscape Survey	To record important hedgerows	Completion of reporting, dissemination of results, submission of an ordered

Additional mitigation measures	Objective	Achievement criteria and reporting requirements
	elements prior to their removal	archive to an appropriate repository.

1.15.111 These measures are secured through inclusion in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

Residual effects

1.15.112 The residual significance of effect during construction has been assessed to be negligible for eight historic buildings and one HLT for Cae Canol-dydd. During operation, the residual significance of effect has been assessed to be negligible for three historic buildings.

1.15.113 The residual significance of effect during construction has been assessed to be negligible for seven historic buildings and two HLTs for Cors Gwawr. During operation, the residual significance of effect has been assessed to be negligible for five historic buildings.

1.15.114 The residual significance of effect during construction has been assessed to be minor for four historic buildings and negligible for two historic buildings and one HLT for Ty du. No impacts were predicted as a result of the operation of Ty du.

1.16 Combined topic effects

Introduction

1.16.2 Combined topic effects, also known as intra-development effects, occur when a single receptor is affected in more than one way by the same development.

1.16.3 This section considers those receptors that would experience more than one of the minor, moderate or major residual effects identified in the preceding topic assessment sections, and describes the predicted combined effects that would result. Effects from construction and operation are considered.

1.16.4 Combined topic effects may be contributed to by multiple effects reported in one topic section (e.g. both a noise and a vibration effect) and/or in more than one topic section (e.g. both a noise and an air quality effect). Where combined topic effects result from individual effects reported in different topic areas, there is no published methodology for assessing such effects and assigning a level of significance to them, and so the assessment is limited to descriptions of the effects that would combine, based on professional judgement as to which individual effects would combine. The potential is recognised for the people affected to consider the combined effect to be significant. Where combined topic effects result from individual effects reported within one topic, the significance criteria are as described in the relevant topic chapter in volume B (Application Reference Numbers: 6.2).

Combined effects

Properties in the vicinity of Cae Canol-dydd

1.16.5 There are likely to be combined effects on residents in the vicinity of Cae Canol-dydd during construction due to adverse effects resulting from an increase in noise levels and vibration, in combination with changes in visual amenity and perceived changes in dust deposition rates.

1.16.6 Combined effects could arise as a result of minor adverse noise effects at two properties located in close proximity to the north and east of the site, in combination with moderate adverse effects on visual amenity. While there would be a not significant effect resulting from dust deposition on air quality, people who experience noise, vibration and/or visual effects may be more likely to feel that dust deposition at a particular level contributes to a combined topic effect.

1.16.7 It is possible that the people affected may perceive these combined effects to be significant during construction.

Properties in the vicinity of Cors Gwawr

1.16.8 There are likely to be combined effects on residents in the vicinity of Cors Gwawr during construction due to adverse effects resulting from an increase in noise levels and vibration, in combination with changes in visual amenity and perceived changes in dust deposition rates.

1.16.9 Combined effects could arise as a result of minor adverse noise effects at two properties located in close proximity to the north and east of the site, in combination with moderate adverse effects on visual amenity. While there would be a not significant effect resulting from dust deposition on air quality, people who experience noise, vibration and/or visual effects may be more likely to feel that dust deposition at a particular level contributes to a combined topic effect.

1.16.10 It is possible that the people affected may perceive these combined effects to be significant during construction.

Properties in the vicinity of Ty du

1.16.11 There are likely to be combined effects on residents in the vicinity of Ty du during construction due to adverse effects resulting from an increase in noise levels and vibration, in combination with changes in visual amenity.

1.16.12 Combined effects could arise as a result of minor adverse noise effects at two properties located in close proximity to the north and east of the site, in combination with moderate adverse effects on visual amenity. It is likely that some people affected would perceive this combined effect to be significant.

1.17 References

ID	Reference
RD1	Isle of Anglesey Council. 2015. Llangefni Link Road – Transport Assessment.
RD2	Isle of Anglesey County Council. *Isle of Anglesey Definitive Map* [online]. Available from http://publicrightsofway.anglesey.gov.uk/. Accessed 16 January 2018
RD3	http://www.first-nature.com/waleswildlife/n-nnr-anglesey-fens.php Accessed 16 January 2018
RD4	http://www.theaa.com/days-out/cors-bodeilio-national-nature-reserve-6770795 Accessed 16 January 2018
RD5	http://angleseynature.co.uk/webmaps/corsbodeilionnr.html Accessed 16 January 2018
RD6	Institute of Air Quality Management. 2016. *Guidance on the Assessment of Dust from Demolition and Construction Version 1.1*. London: Institute of Air Quality Management.
RD7	Department for Environment, Food and Rural Affairs. 2016. *Local Air Quality Management, Technical Guidance (TG16)*. London: Department for Environment, Food and Rural Affairs.
RD8	Vallack, H. W. and Shillito, D. E. 1998. Suggested guidelines for deposited ambient dust. *Atmospheric Environment*. Vol. 32, No. 16, pp. 2737–2744.
RD9	Environment Agency. 2003. Assessment of noise disturbance upon birds and dust on vegetation and invertebrate species. Report Ref. 6502-E.075EA.
RD10	BSI (2008). *British Standard 5228:2009-1+A1:2014 Code of practice for noise and vibration control on construction and open sites*
RD11	Welsh Government (2004). *Minerals Technical Advice Note (MTAN) Wales 1: Aggregates* [online]. Available from http://gov.wales/topics/planning/policy/mineralstans/2888891/?lang=en. Accessed January 2018.
RD12	Soil Survey of England and Wales. 1983. *Soils of England and Wales, Sheet 2. Wales.* London: Her Majesty's Stationery Office.
RD13	Roberts, E. 1958. *County of Anglesey, Soils and Agriculture, 1:63,360*. London: Her Majesty's Stationery Office.
RD14	Ministry of Agriculture, Fisheries and Food. 1988. *Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*. London: Her Majesty's Stationery Office.

ID	Reference
RD15	Ministry of Agriculture, Fisheries and Food. 1977. *1:250,000 Series Agricultural Land Classification: Wales*.
RD16	British Geological Survey. 2017. *GeoIndex.* [Online]. [Accessed: December 2018]. Available from: http://www.bgs.ac.uk/geoindex/
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RD18	Groundsure. 2017. *Enviro Insight, Geo Insight and Large and Small Scale Historical Maps Report Pack (GS-4559308, 4559309 and 4559310)*.
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RD31	Natural Resources Wales (NRW). 2015. *NRW flood mapping*. [Online]. [Accessed: 09 June 2017]. Available from: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en
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ID	Reference
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ID	Reference
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1.18 Figures

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FIGURE 1

Legend

- Cae Canol-dydd Ecological Compensation Site
- Study area
- Public Right of Way
- NCN Routes

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES: CAE CANOL-DYDD
PUBLIC ACCESS AND RECREATION BASELINE

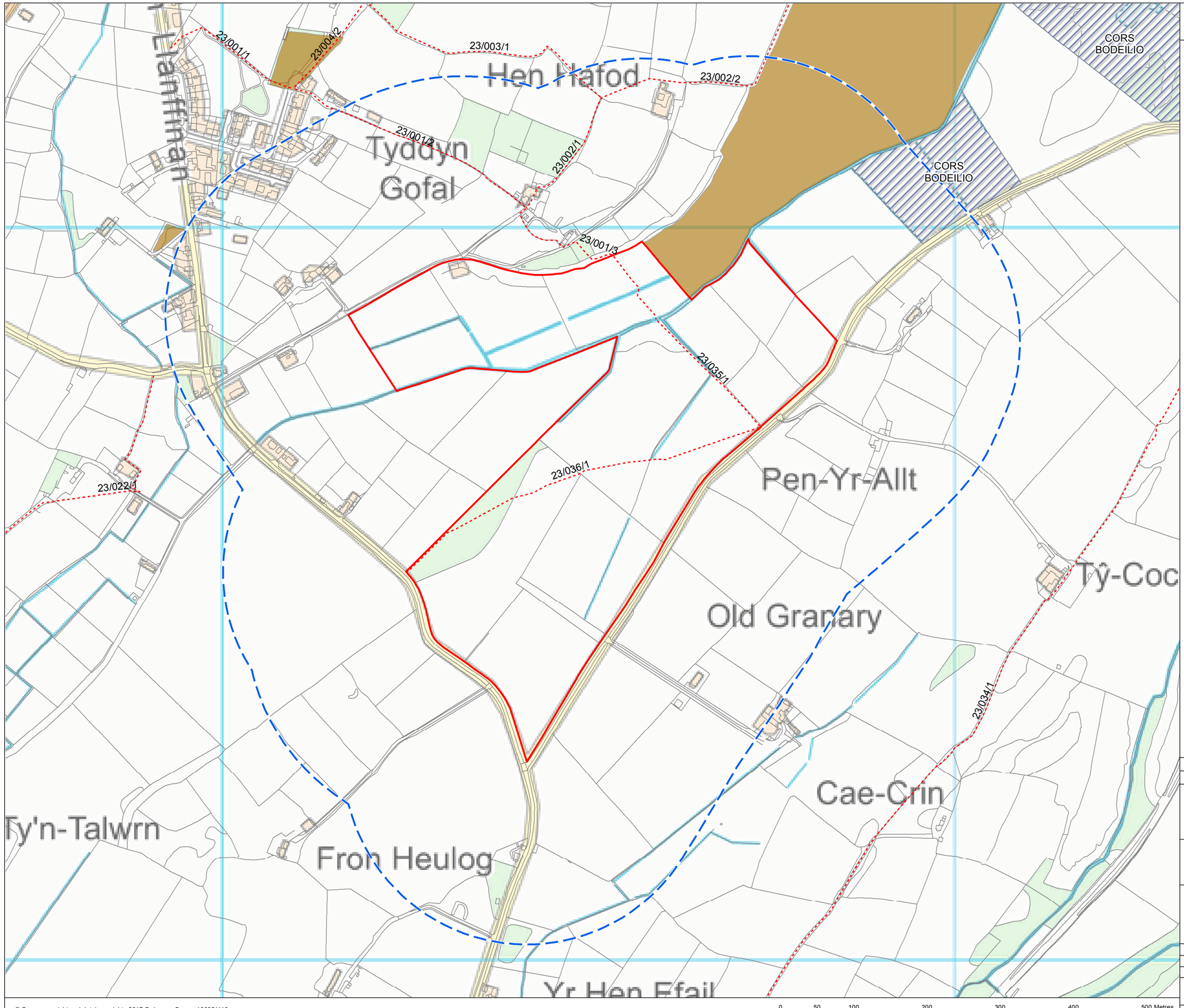
Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_PA_01

0 50 100 200 300 400 500 Metres

FIGURE 2



Legend

- Cors Gwawr Ecological Compensation Site
- Study area
- Public Right of Way
- Registered Common Land
- National Nature Reserve (NNR)

0 50 100 200 300 400 500 Metres

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES: CORS GWAWR
PUBLIC ACCESS AND RECREATION BASELINE

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_PA_02

FIGURE 3

Legend

- Ty du Ecological Compensation Site
- Study area
- Public Right of Way

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES: TY DU
PUBLIC ACCESS AND RECREATION BASELINE

Scale @ A3	1:5,005	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_PA_03

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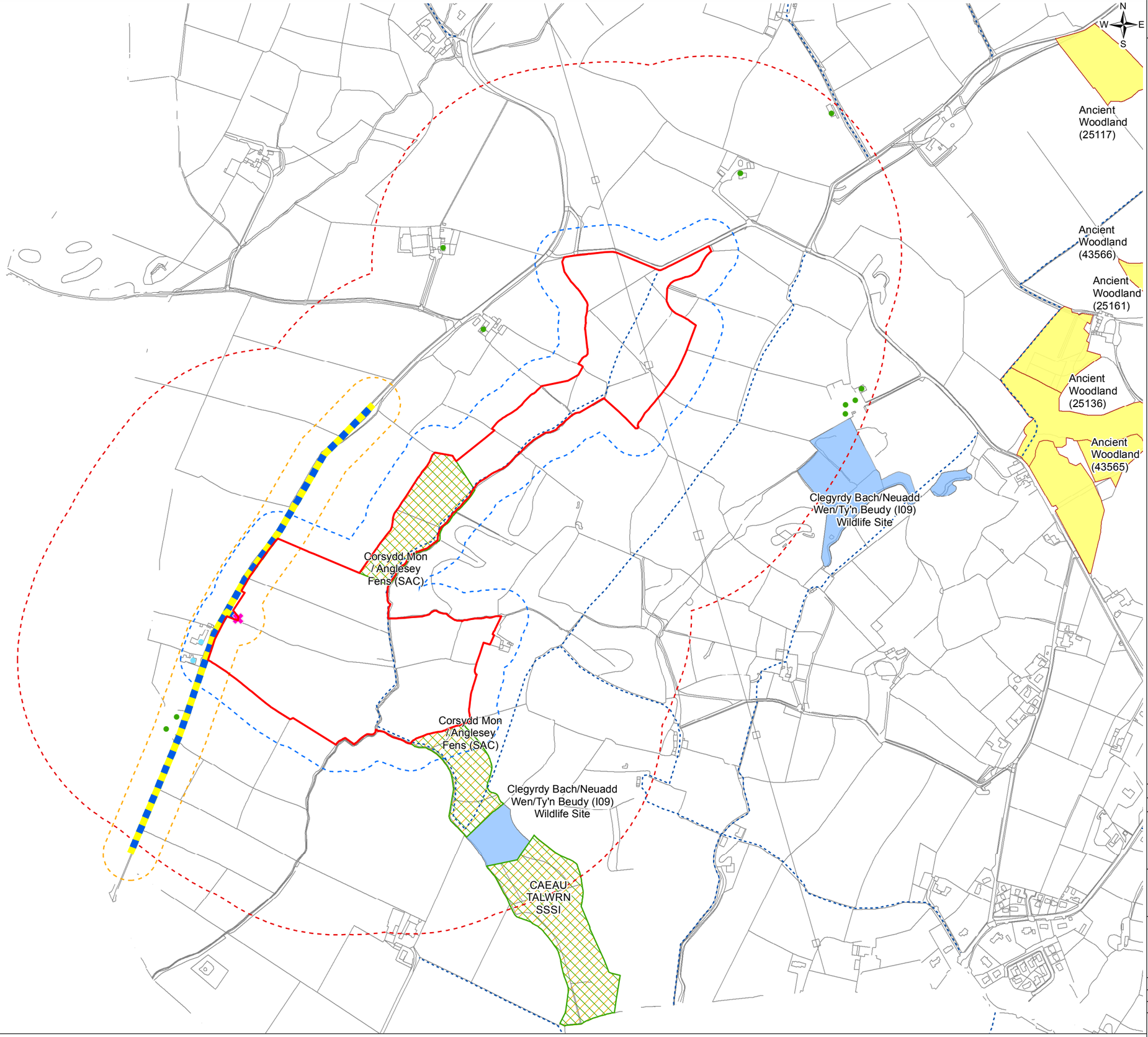
FIGURE 4



Legend

- Cae Canol-dydd Ecological Compensation Site
- Construction dust assessment study area for ecological receptors (50m from the Cae Canol-dydd order limit)
- Construction dust assessment study area for human receptors (350m from the Cae Canol-dydd order limit)
- Construction dust assessment study area (50m from the route(s) used by construction vehicles up to 500m from the site entrance)
- Public Rights of Way
- Site entrance
- Access route up to 500m from the site entrance

Cae Canol-dydd human receptor location

- 0-20m
- 100-350m

Ecological receptor

- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC) / Candidate SAC (cSAC)
- Ancient Woodland
- Wildlife Site

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES: CAE CANOL-DYDD CONSTRUCTION DUST ASSESSMENT STUDY AREAS AND HUMAN AND ECOLOGICAL RECEPTORS

Scale @ A3	1:7,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No. 60PO8077_DCO_AQ_04

0 50 100 200 300 400 500 Metres

FIGURE 5

CORS Y FARL SSSI

Corsydd Mon / Anglesey Fens (SAC)

CORS BODEILIO SSSI

Corsydd Mon / Anglesey Fens (SAC)

Tir Pori Talwrn (I11) Wildlife Site

CAEAU TALWRN SSSI

Tir Pori Talwrn (I11) Wildlife Site

Tir Pori Talwrn (I11) Wildlife Site

Ancient Woodland (25113)

N W E S

Legend

- Cors Gwawr Ecological Compensation Site
- Construction dust assessment study area for ecological receptors (50m from the Cors Gwawr order limit)
- Construction dust assessment study area for human receptors (350m from the Cors Gwawr order limit)
- Construction dust assessment study area (50m from the route(s) used by construction vehicles up to 500m from the site entrance)
- Public Rights of Way
- Site entrance
- Access route up to 500m from the site entrance

Cors Gwawr human receptor location

- 50-100m
- 100-350m
- Outside 350m but within 50m of access road

Ecological receptor

- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC) / Candidate SAC (cSAC)
- Ancient Woodland
- Wildlife Site

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

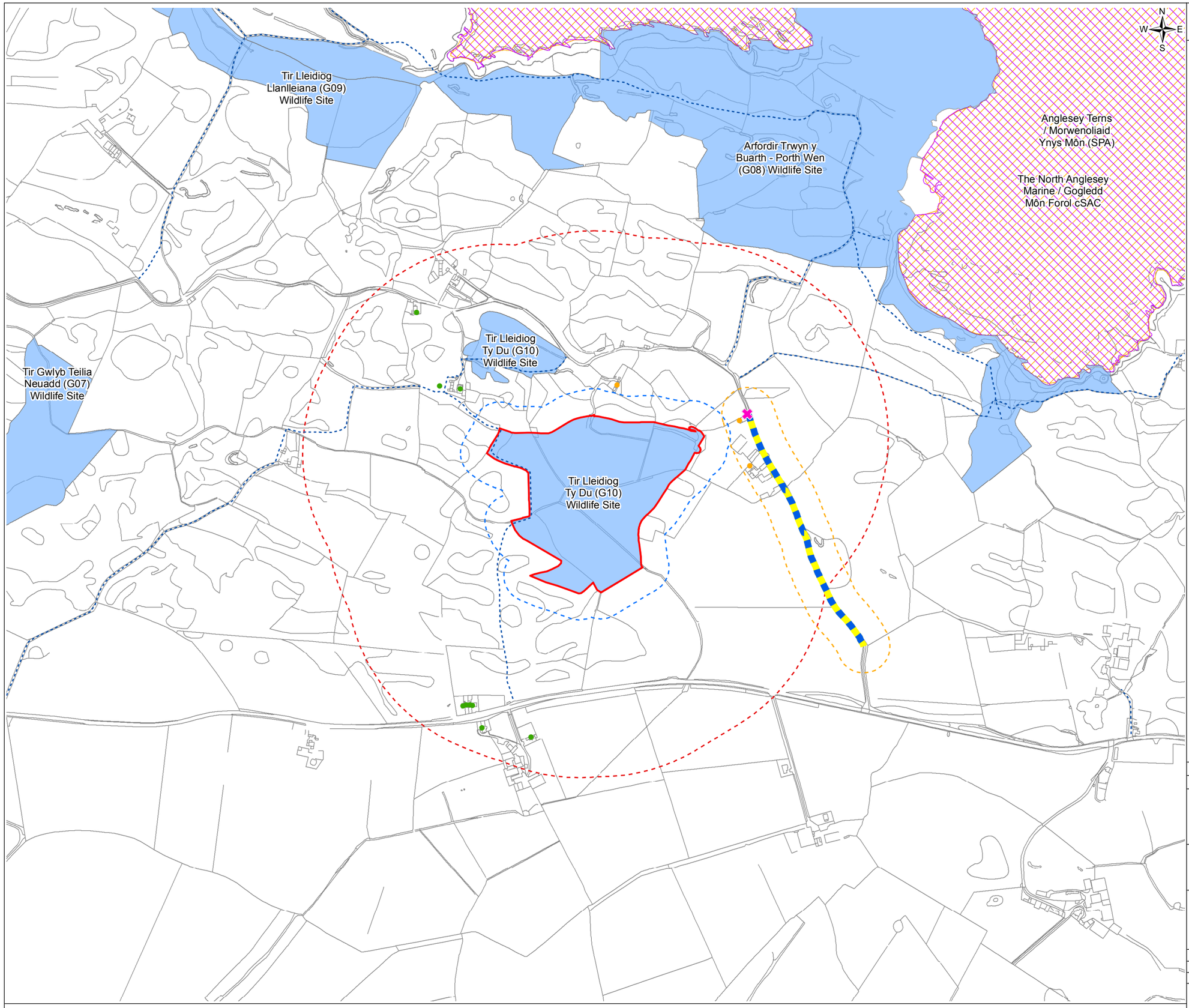
Drawing Title: ECOLOGICAL COMPENSATION SITES: CORS GWAWR CONSTRUCTION DUST ASSESSMENT STUDY AREAS AND HUMAN AND ECOLOGICAL RECEPTORS

Scale @ A3	1:7,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No. 60PO8077_DCO_AQ_05

0 50 100 200 300 400 500 Metres

FIGURE 6



Legend

- Ty du Ecological Compensation Site
- Construction dust assessment study area for ecological receptors (50m from the Ty du boundary)
- Construction dust assessment study area for human receptors (350m from the Ty du boundary)
- Construction dust assessment study area (50m from the route(s) used by construction vehicles up to 500m from the site entrance)
- Public Rights of Way
- Site entrance
- Access route up to 500m from the Site Entrance

Ty Du human receptor location

- 50-100m
- 100-350m

Ecological receptor

- Special Protection Area (SPA)
- Special Area of Conservation (SAC) / Candidate SAC (cSAC)
- Wildlife Site

0 50 100 200 300 400 500 Metres

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES: TY DU
CONSTRUCTION DUST ASSESSMENT STUDY AREAS
AND HUMAN AND ECOLOGICAL RECEPTORS

Scale @ A3	1:7,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_AQ_06

FIGURE 7

Legend

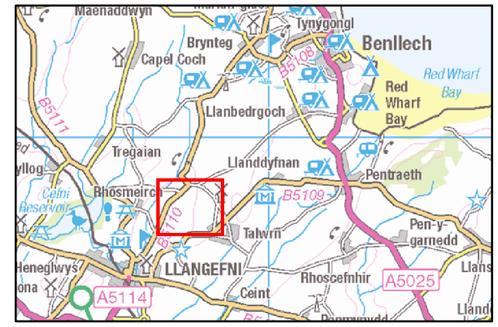
- Ecological Compensation Sites
- Soils and geology study area

Provisional Agricultural Land Classification (ALC)

- Grade 3 - good to moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality

Source: Ministry of Agriculture, Fisheries and Food. 1977. *1:250,000 Series Agricultural Land Classification: Wales.*

Note: It should be noted that the provisional ALC data only provide a generalised indication of the potential ALC grades present and are known to be inaccurate in some locations.



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD SOILS AND GEOLOGY STUDY AREA
AND AGRICULTURAL LAND CLASSIFICATION

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_SG_07

Licence information for additional legend items can be found in Appendix A1-1, Application Reference Number: 6.1.8

0 50 100 200 300 400 500 Metres

FIGURE 8

Source no.	Description
1	Potentially infilled ponds and marshland
2	Disused limekiln and old quarry
3	Potentially infilled pond
4	Potentially infilled pond
5	Potentially infilled former pit
6	Former quarry

N
W E
S

1
2
3
4
5
6

Legend

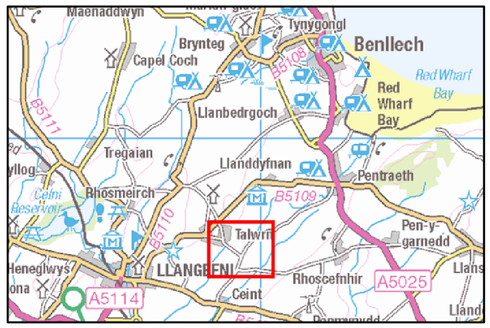
- Ecological compensation sites
- Soils and geology study area
- Potential source of contamination

Provisional Agricultural Land Classification (ALC)

- Grade 3 - good to moderate quality
- Grade 5 - very poor quality

Source: Ministry of Agriculture, Fisheries and Food. 1977. *1:250,000 Series Agricultural Land Classification: Wales.*

Note: It should be noted that the provisional ALC data only provide a generalised indication of the potential ALC grades present and are known to be inaccurate in some locations.



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
CORS GWAWR
SOILS AND GEOLOGY STUDY AREA,
AGRICULTURAL LAND CLASSIFICATION AND POTENTIAL
SOURCES OF CONTAMINATION

Scale @ A3	1:6,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_SG_08

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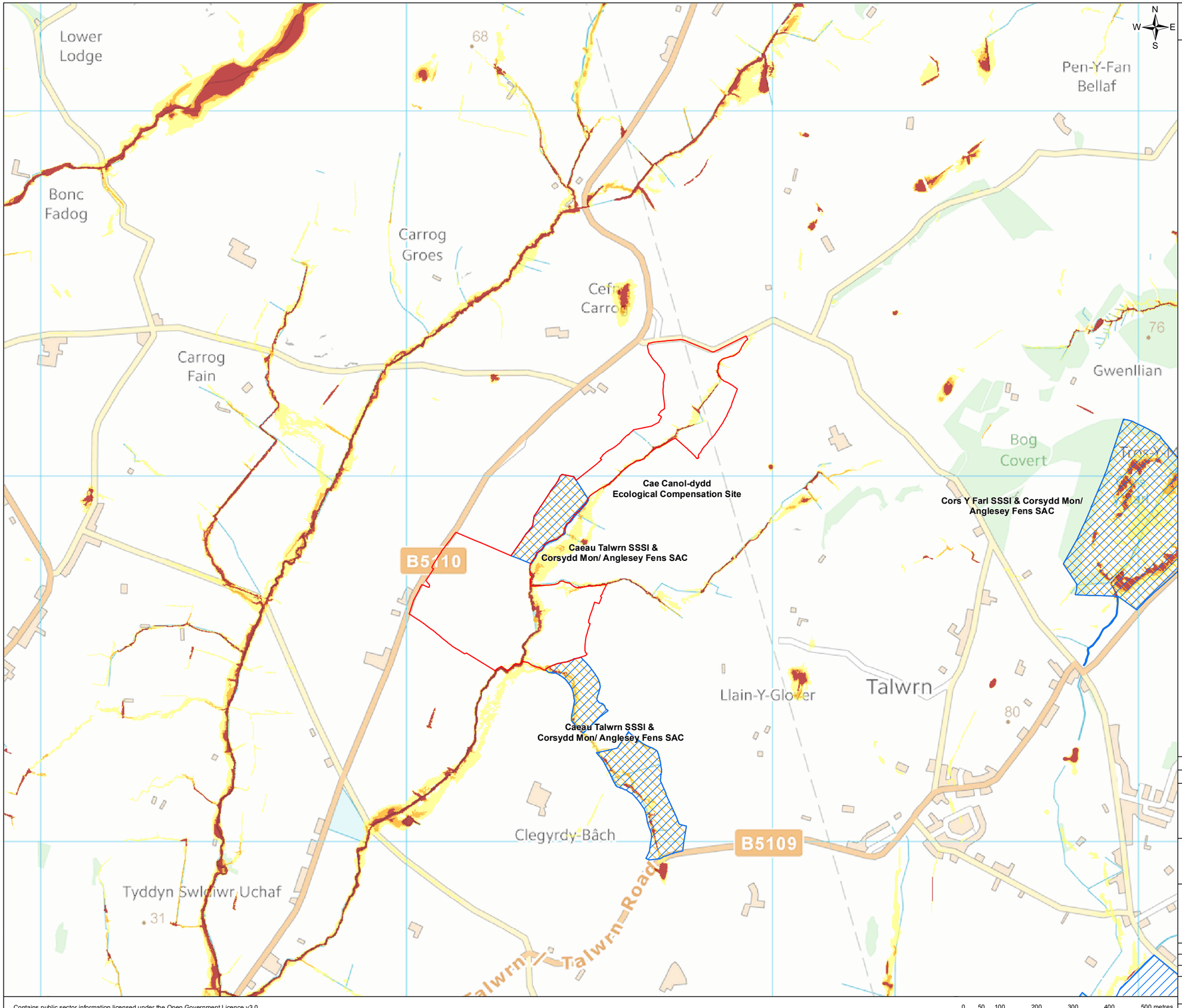
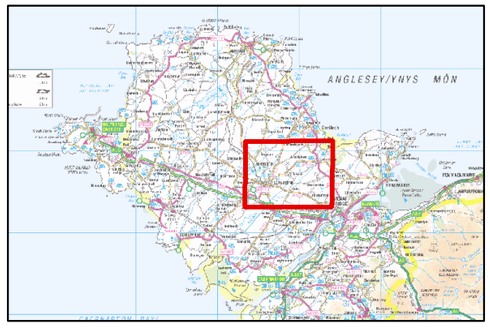
FIGURE 9



Legend

- Cae Canol-dydd Ecological Compensation Sites
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- High surface water flood risk - extent
- Medium surface water flood risk - extent
- Low surface water flood risk - extent



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD
NRW SURFACE WATER FLOOD MAP

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_HYD_09

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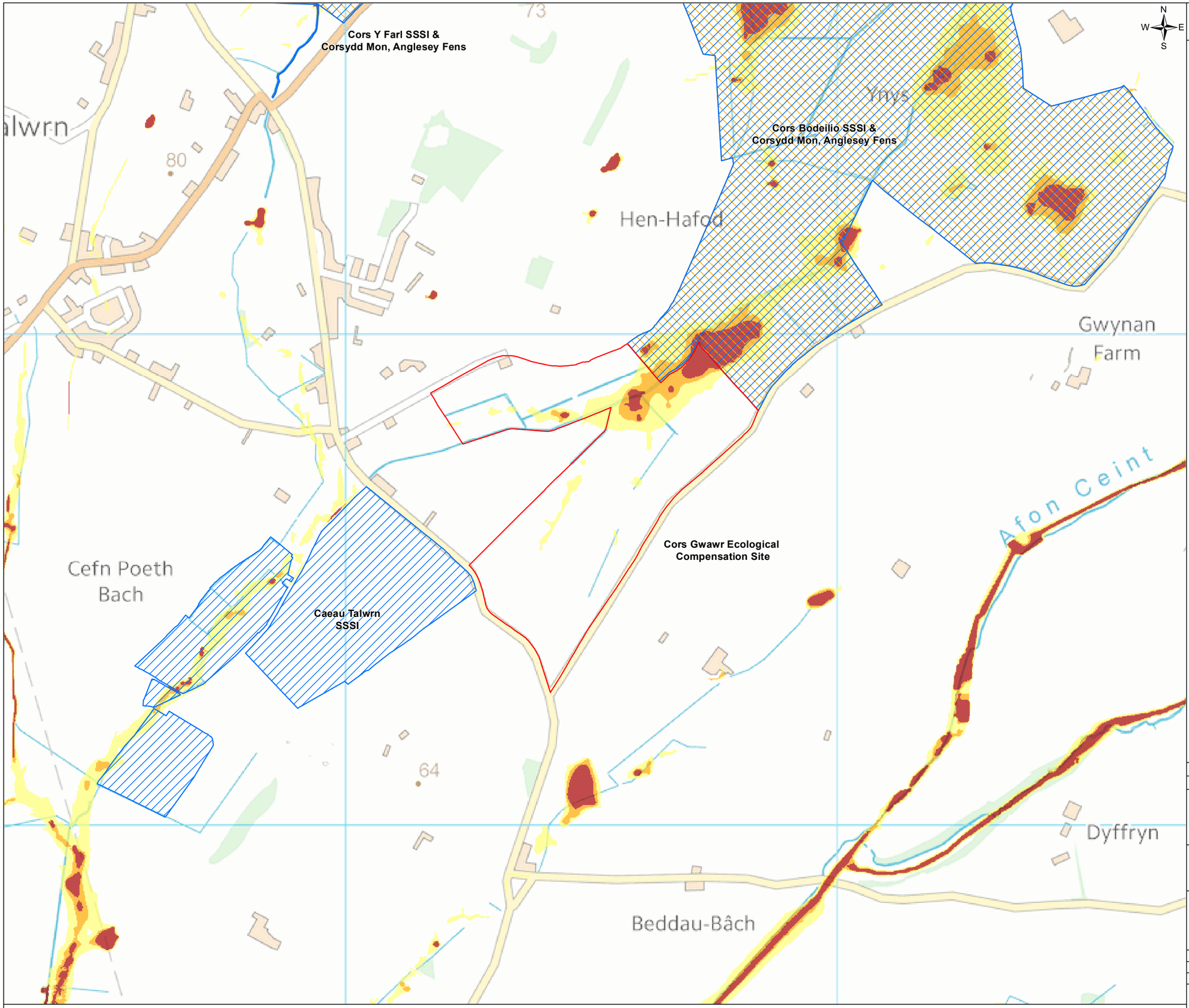
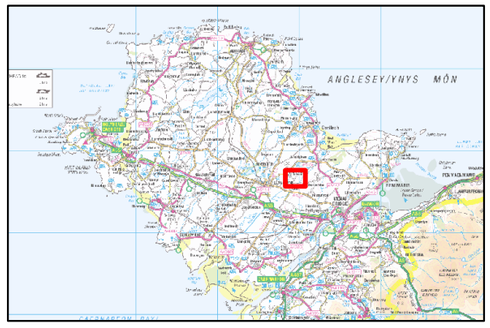
FIGURE 10



Legend

- Cors Gwawr Ecological Compensation Site
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- High surface water flood risk - extent
- Medium surface water flood risk - extent
- Low surface water flood risk - extent



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES:
CORS GWAWR
NRW SURFACE WATER FLOOD MAP

Scale @ A3	1:7,500	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_HYD_10

Licence information for additional legend items can be found in Appendix A1-1, Application Reference Number: 6.1.8

0 50 100 200 300 400 500 metres

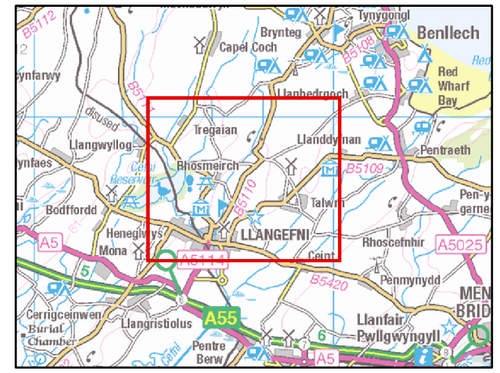
FIGURE 11

Legend

- Cae Canol-dydd Ecological Compensation Site
- 2km buffer from Ecological Compensation Site
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland
- Anglesey County Council Wildlife Site

Cofnod data 2007 - 2017 (only data referred to in the Environmental Statement has been displayed)

- Terrestrial Mammal
- Observation point for bird records
- Reptile
- Amphibian



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES: CAE CANOL-DYDD
COFNOD RECORDS: 2007 - 2017

Scale @ A3	1:20,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No. 60PO8077_DCO_EC_11

0 125 250 500 750 1,000 Metres

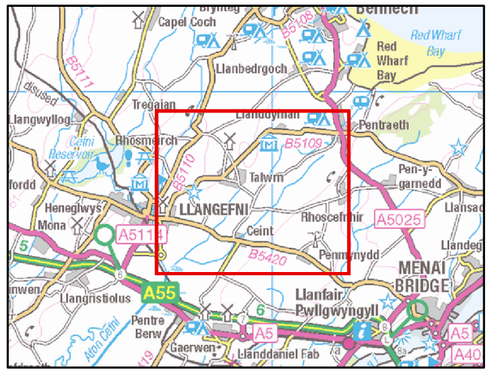
FIGURE 12

Legend

- Cors Gwawr Ecological Compensation Site
- 2km buffer from SSSI Compensation Site
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland
- Anglesey County Council Wildlife Site

Cofnod data 2007 - 2017 (only data referred to in the Environmental Statement has been displayed)

- Terrestrial Mammal
- Bird
- Reptile
- Amphibian



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES: CORS GWAWR
COFNOD RECORDS: 2007 - 2017

Scale @ A3	1:20,000	DO NOT SCALE
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Client No.		

Drawing No.

60PO8077_DCO_EC_12

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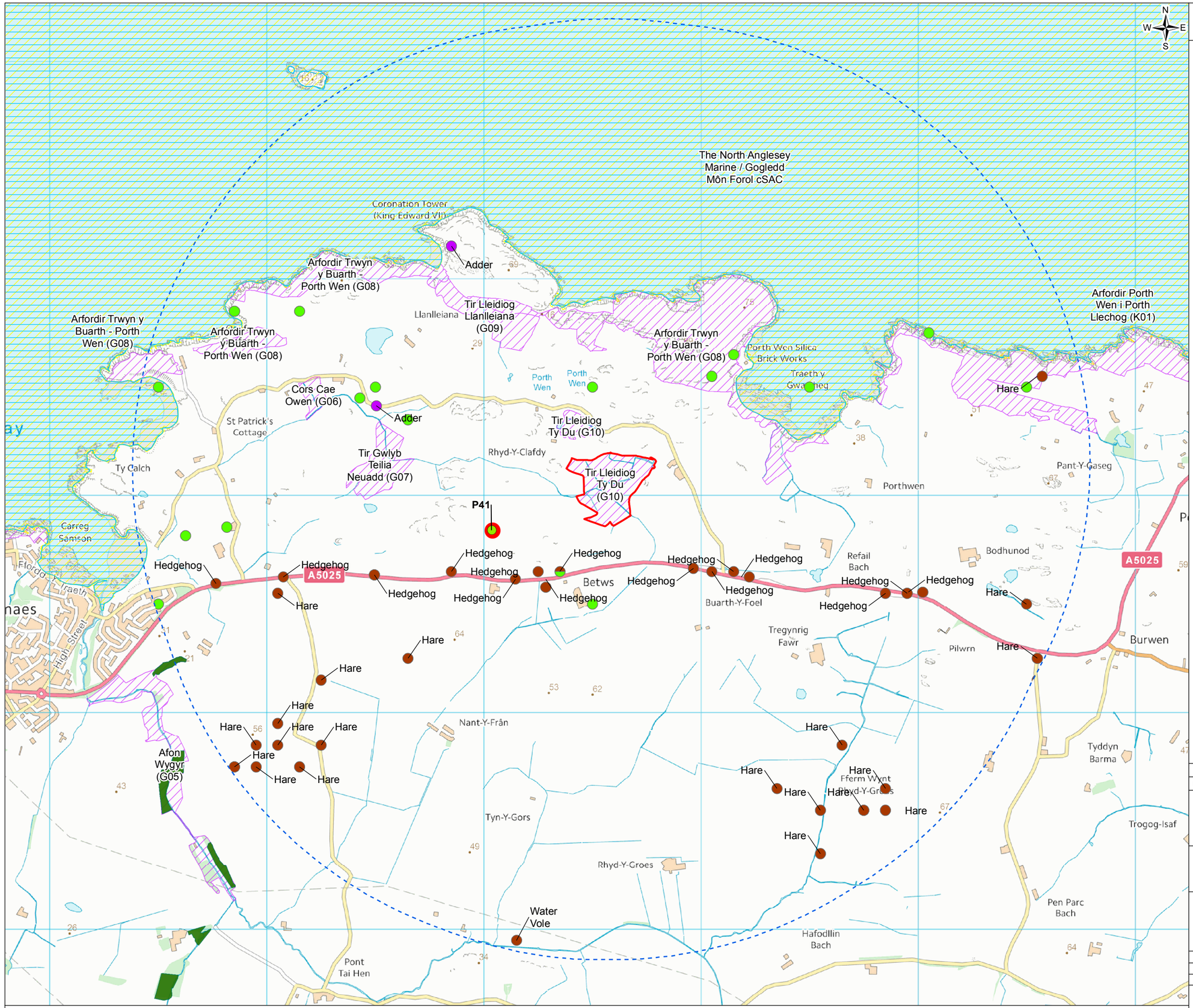
FIGURE 13



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Licence information for additional legend items can be found in Appendix A1-1, Application Reference Number: 6.1.8

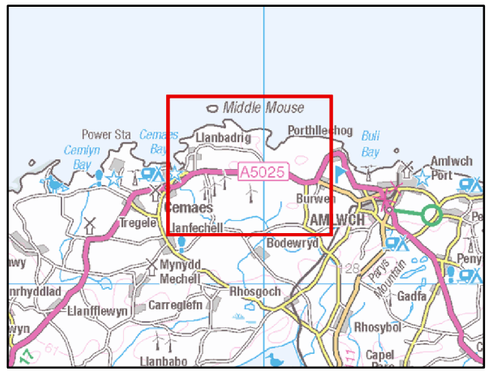
0 125 250 500 750 1,000 Metres

Legend

- Ty du Ecological Compensation Site
- 2km buffer from Ecological Compensation Site
- Special Area of Conservation (SAC) / Candidate SAC (cSAC)
- Special Protection Area (SPA)
- Ancient Woodland
- Anglesey County Council Wildlife Site
- Jacobs eDNA results 2016 - GCN present

Cofnod data 2007 - 2017 (only data referred to in the Enivironmental Statement has been displayed)

- Terrestrial Mammal
- Observation point for bird records
- Reptile
- Amphibian



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES: TY DU
COFNOD RECORDS: 2007 - 2017

Scale @ A3	1:17,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_EC_13

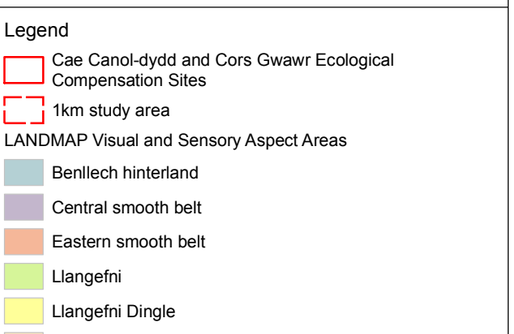
FIGURE 14

Legend

- Cae Canol-dydd and Cors Gwawr Ecological Compensation Sites
- 1km study area

LANDMAP Visual and Sensory Aspect Areas

- Benllech hinterland
- Central smooth belt
- Eastern smooth belt
- Llangefni
- Llangefni Dingle
- Pentraeth valleys



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD AND CORS GWAWR
PUBLISHED SOURCES OF LANDSCAPE CHARACTER

Scale @ A3	1:17,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_LV_14

0 100 200 400 600 800 1,000 metres

FIGURE 15

Legend

- Cae Canol-dydd and Cors Gwawr Ecological Compensation Sites
- 1km study area
- Public footpath
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- Registered common land (Natural Resources Wales)
- Conservation Area
- Ancient woodland
- Woodland
- Watercourse
- Surface water feature

Notes:
1. Areas of woodland have been taken from the 1:25,000 scale Ordnance Survey mapping.

2. Areas of ancient woodland have been taken from Natural Resources Wales.

3. Watercourses and surface water features have been taken from the 1;25,000 scale Ordnance Survey mapping

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

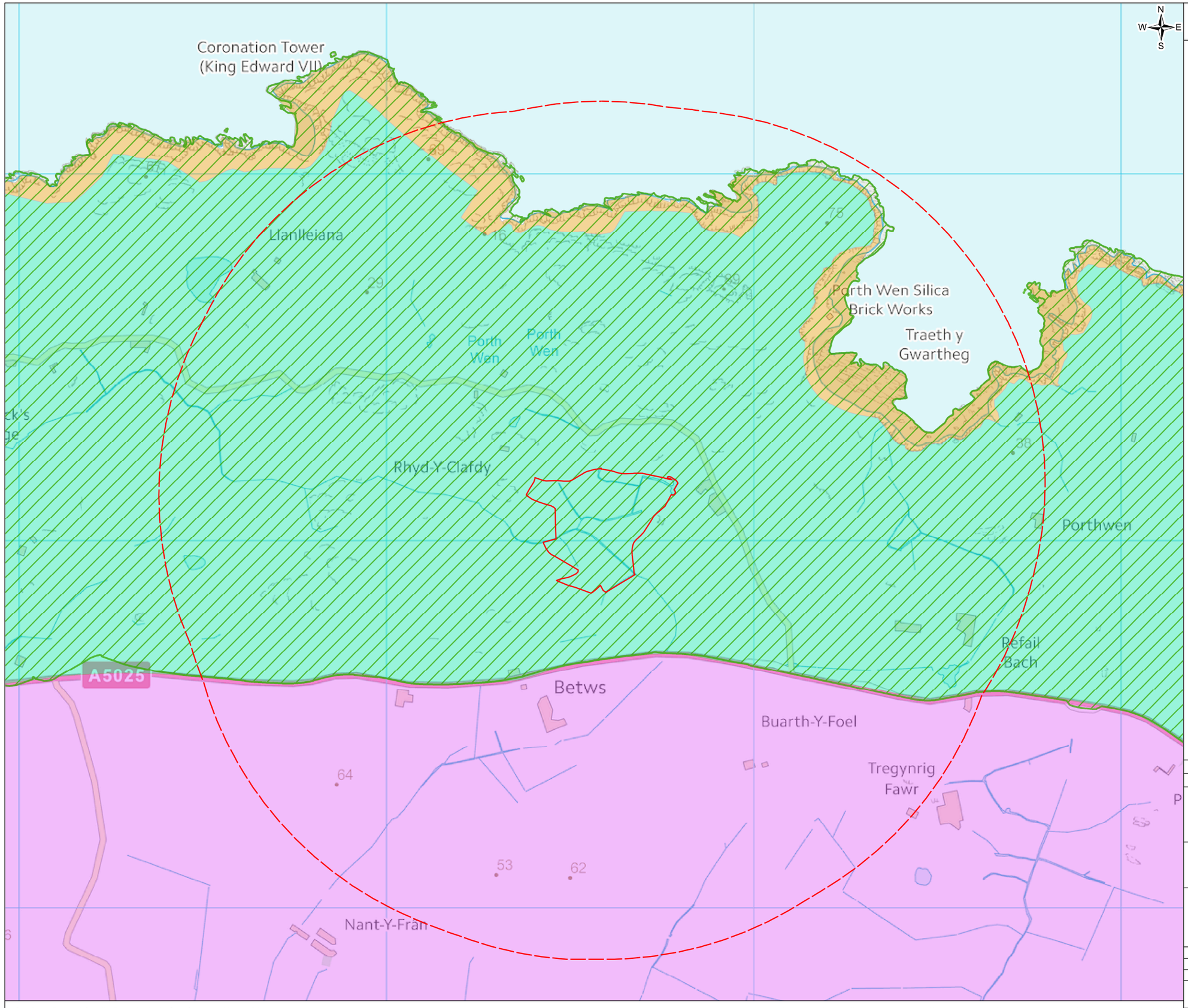
Drawing Title: ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD AND CORS GWAWR
LANDSCAPE PLANNING CONTEXT AND
LOCAL LANDSCAPE CONTEXT

Scale @ A3	1:17,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_LV_15

0 100 200 400 600 800 1,000 metres

FIGURE 16



Legend

- Ty du Ecological Compensation Site
- 1km study area
- Ynys Môn/Anglesey Area of Outstanding Natural Beauty

LANDMAP Visual and Sensory Aspect Areas

- Drumlins with windfarms
- North coast
- North coast hinterland

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
TY DU
PUBLISHED SOURCES OF LANDSCAPE CHARACTER

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_LV_16

Licence information for additional legend items can be found in Appendix A1-1, Application Reference Number: 6.1.8

FIGURE 17

Coronation Tower (King Edward VII)
Llanlleiana
Porth Wen
Porth Wen Silica Brick Works
Traeth y Gwartheg
Rhyd-Y-Clafdy
Porthwen
Refail Bach
Betws
Buarth-Y-Foel
Tregynrig Fawr
Nant-Y-Fran
A5025

Legend

- Ty du Ecological Compensation Site
- 1km study area
- Public footpath
- Wales Coast Path
- Llanbadrig - Dinas Gynfor Site of Special Scientific Interest (SSSI)
- North Anglesey Marine/ Gogledd Mon Forol Special Area of Conservation (SAC)
- Ynys Môn/Anglesey Area of Outstanding Natural Beauty
- Open Access - Open Country
- Woodland
- Watercourse
- Surface water feature

Notes:
1. Areas of woodland have been taken from the 1:25,000 scale Ordnance Survey mapping.

2. Watercourses and surface water features have been taken from the 1;25,000 scale Ordnance Survey mapping

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

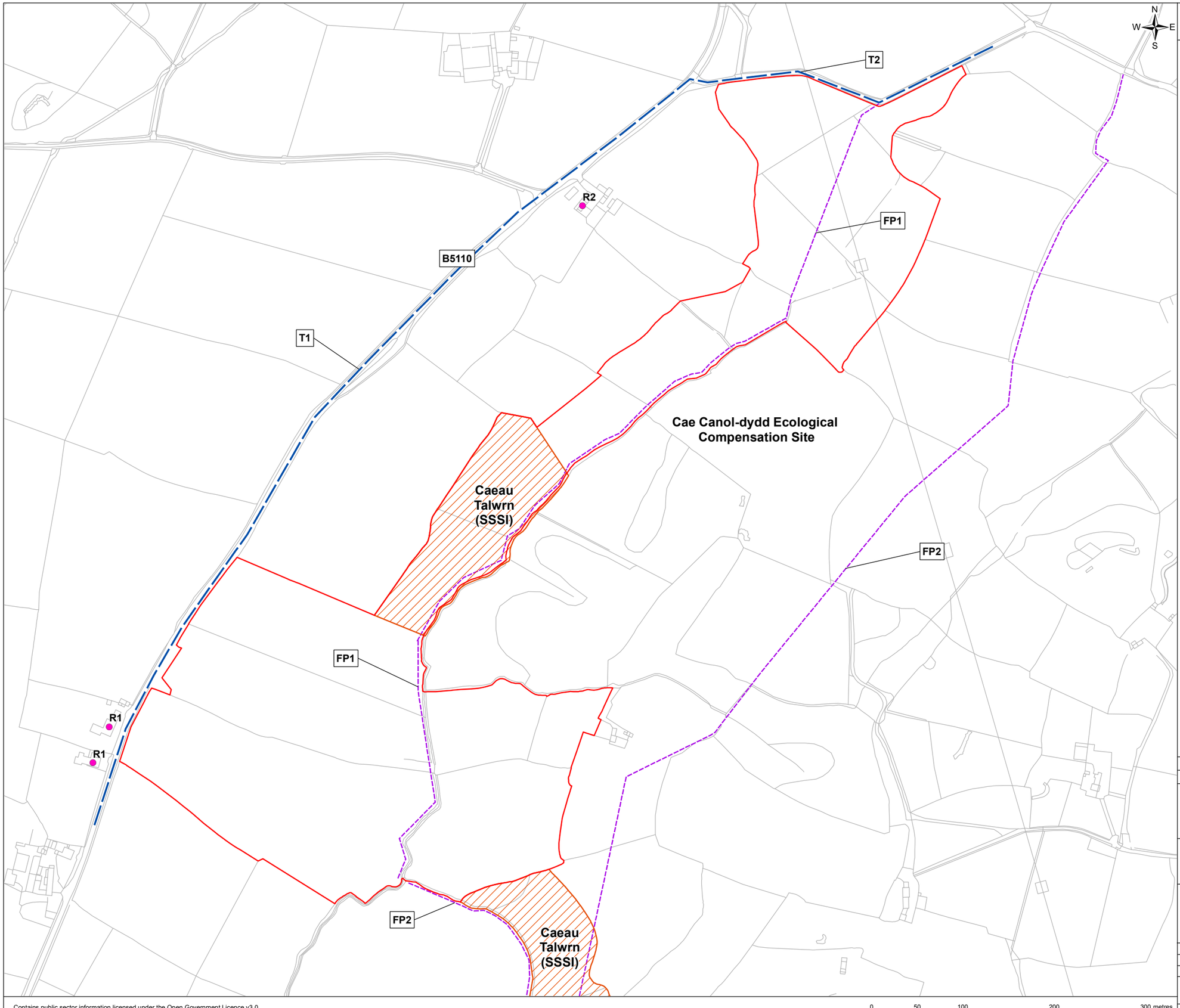
Drawing Title: ECOLOGICAL COMPENSATION SITES: TY DU
LANDSCAPE PLANNING CONTEXT AND
LOCAL LANDSCAPE CONTEXT

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No. 60PO8077_DCO_LV_17

0 100 200 400 600 800 1,000 metres

FIGURE 18



Legend

- Cae Canol-dydd Ecological Compensation Sites
- Site of Special Scientific Interest (SSSI)

Visual Receptors

- Community/ residential
- Walkers on Public Rights of Way
- Users of the local road network

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

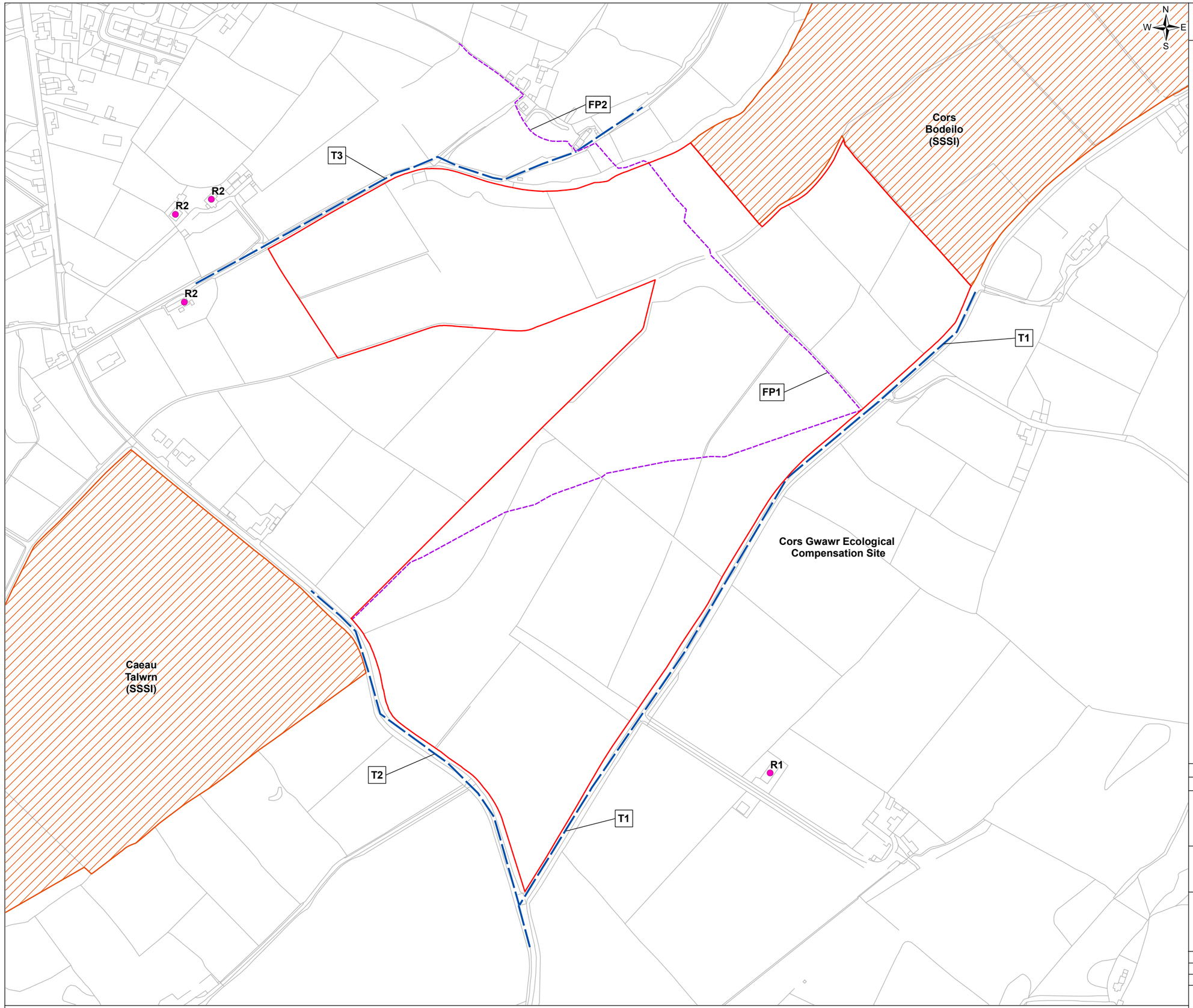
Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD
VISUAL ASSESSMENT

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_LV_18

FIGURE 19



Legend

- Cors Gwawr Ecological Compensation Site
- Visual Receptors
- Community / residential
- Walkers on Public Rights of Way
- Users of the local road network
- Site of Special Scientific Interest (SSSI)

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

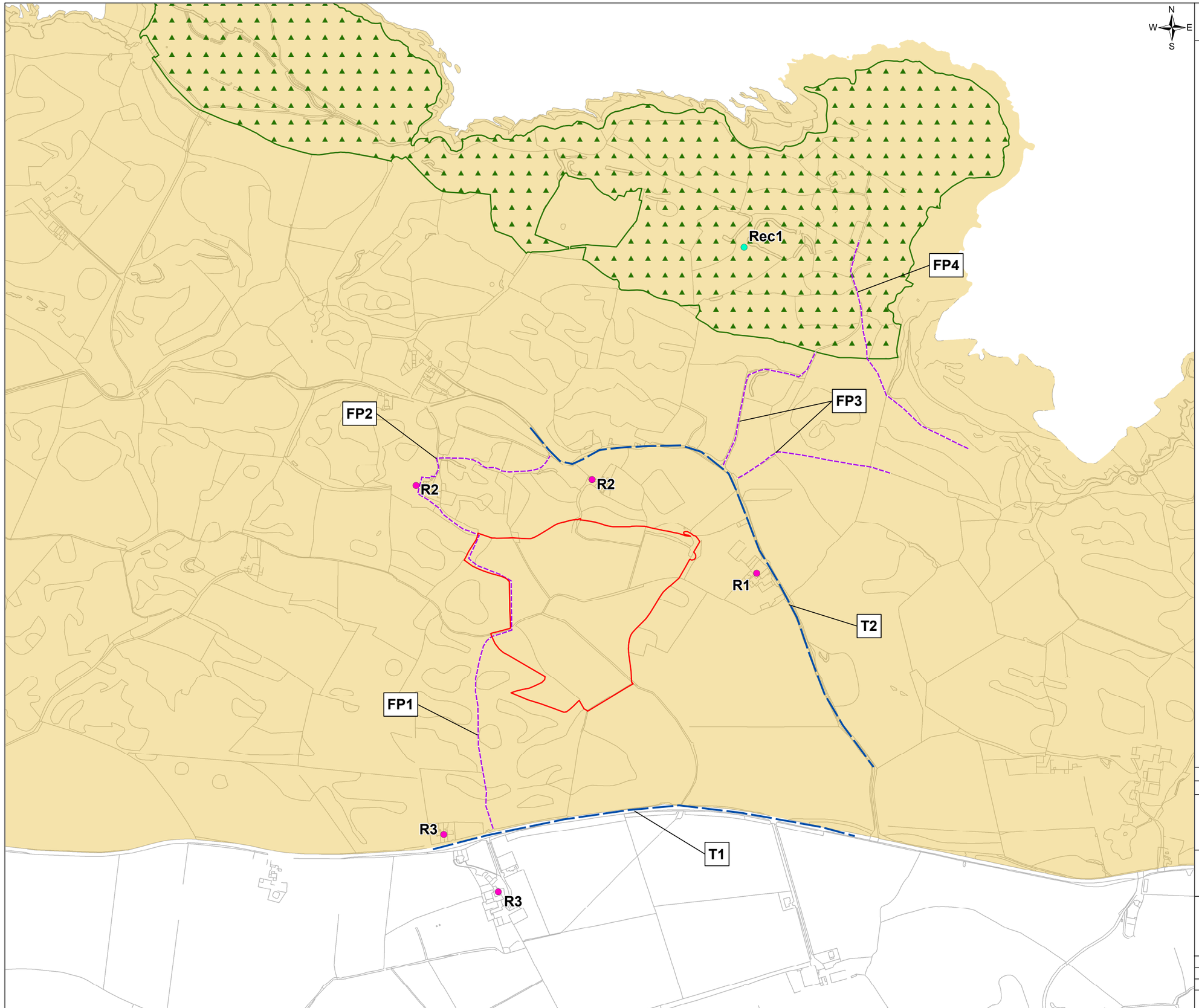
ECOLOGICAL COMPENSATION SITES:
CORS GWAWR
VISUAL ASSESSMENT

Scale @ A3	1:3,500	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_LV_19

FIGURE 20

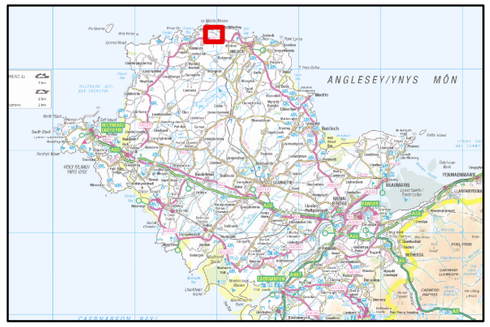


Legend

- Ty du Ecological Compensation Site

Visual Receptors

- Community / residential
- Public / Recreational Areas
- Walkers on Public Rights of Way
- Users of the local road network
- Ynys Môn/Anglesey Area of Outstanding Natural Beauty
- Open Access - Open Country



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
TY DU
VISUAL ASSESSMENT

Scale @ A3	1:6,500	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No. 60PO8077_DCO_07

0 50 100 200 300 400 500 metres

FIGURE 21

Legend

- Cae Canol-dydd Ecological Compensation Site
- Cultural Heritage Study Area
- Grade II Listed Building
- Undesignated cultural heritage asset of medium value
- Undesignated cultural heritage asset of low value
- Undesignated cultural heritage asset of negligible value
- Important hedgerow
- HLT 1 - Talwrn
- HLT 2 - Fieldscape, Central Eastern Mon
- HLT 3 - Fieldscape Tre-Ysgawen
- HLT 4 - Fieldscape, Eastern Mon

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
CAE CANOL-DYDD
LOCATIONS OF HERITAGE ASSETS

Scale @ A3	1:12,500	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_CH_21

0 100 200 400 600 800 1,000 metres

FIGURE 22

Legend

- Cors Gwawr Ecological Compensation Site
- Cultural Heritage Study Area
- Grade II Listed Building
- Undesignated cultural heritage asset of medium value
- Undesignated cultural heritage asset of low value
- Undesignated cultural heritage asset of negligible value
- Important hedgerow
- HLT 1 - Fieldscape, Plas Gwyn
- HLT 2 - Talwrn
- HLT 3 - Fieldscape, Central Eastern Mon

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title

ECOLOGICAL COMPENSATION SITES:
CORS GWAWR
LOCATIONS OF HERITAGE ASSETS

Scale @ A3	1:12,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_CH_22

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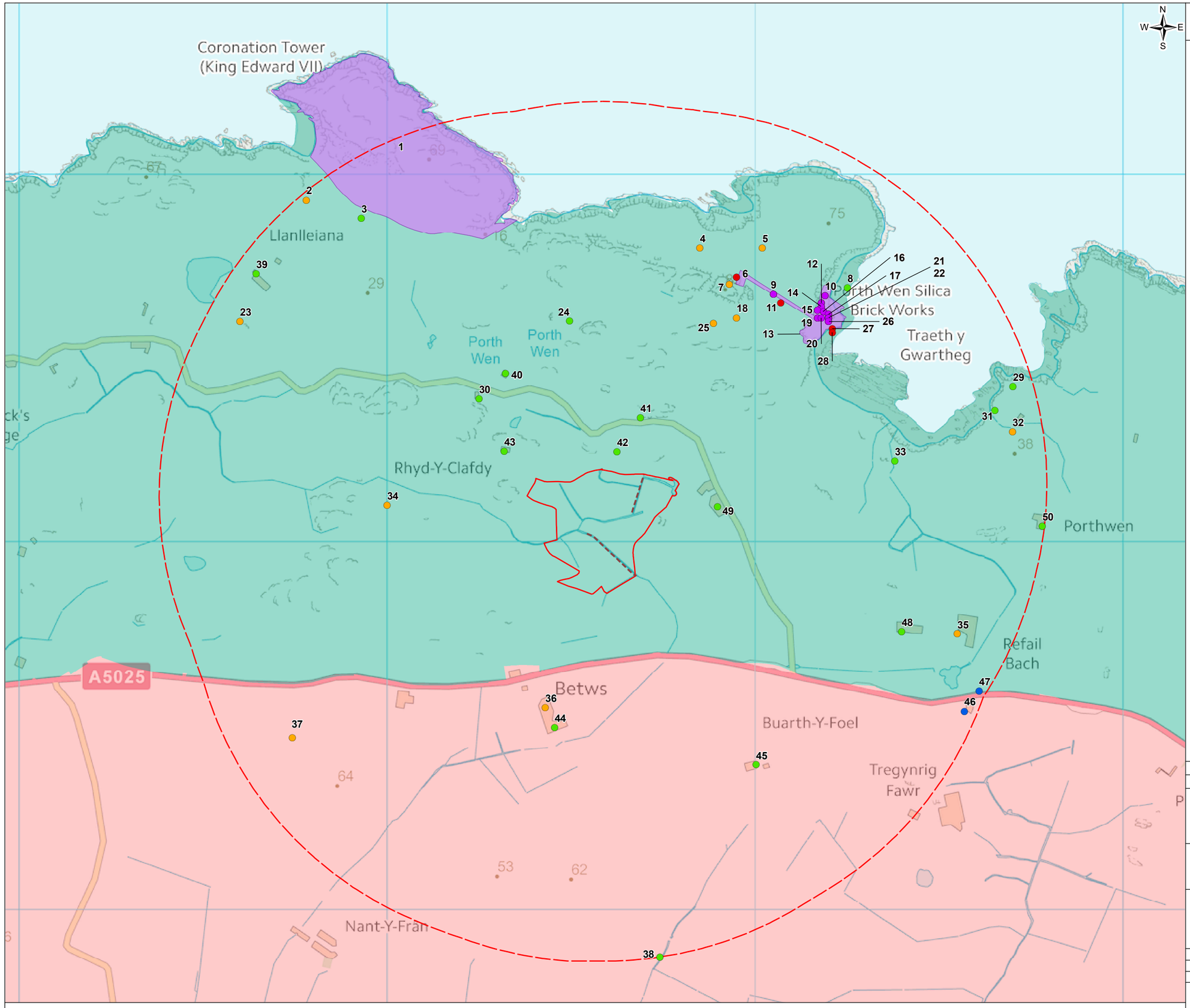
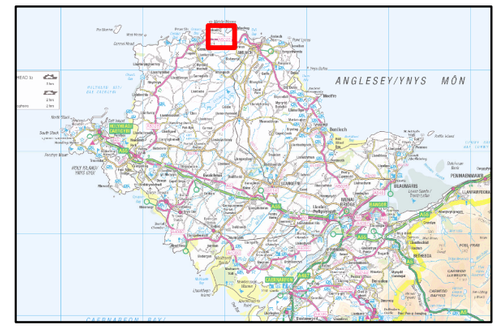
0 100 200 400 600 800 1,000 metres

FIGURE 23



Legend

- Ty du Ecological Compensation Site
- 1km study area
- Scheduled Ancient Monument
- Undesignated cultural heritage asset of high value
- Undesignated cultural heritage asset of medium value
- Undesignated cultural heritage asset of low value
- Undesignated cultural heritage asset of negligible value
- Important hedgerow
- HLT 1 - Fieldscape, Rhosbeirio
- HLT 2 - North Coast, Mon



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROJECT
ENVIRONMENTAL STATEMENT

Drawing Title: ECOLOGICAL COMPENSATION SITES:
TY DU
LOCATIONS OF HERITAGE ASSETS

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.: 60PO8077_DCO_CH_23

Annexe 1: Construction Dust Assessment

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Annex 1: Construction Dust Assessment

Contents

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1 Construction dust assessment

1.1 Scope

1.1.1 This report sets out the assessment of emissions of dust which could potentially occur from the creation of the three separate ecological compensation sites (Ty du, Cae Canol-dydd and Cors Gwawr). This assessment has been carried out in accordance with the latest IAQM guidance [RD1], on the assessment of dust from demolition and construction. This report sets out the full construction dust assessment, including a description of the methodology, relevant input data, the assessment itself, recommended mitigation and monitoring measures and conclusions.

2 Assessment methodology

2.1 Introduction

2.1.1 Activities carried out on construction sites can give rise to emissions of dust which could cause annoyance to people or damage to vegetation due to the soiling of surfaces. These activities can also lead to increased short-term and long-term concentrations of fine particulate matter (e.g. PM_{10} and $PM_{2.5}$) at off-site locations which may affect human health, unless appropriate mitigation measures are implemented. The impacts of dust emissions from the creation of the compensation sites therefore need to be addressed in order to identify the required mitigation measures.

2.1.2 The assessment of dust during the creation of the compensation sites has been carried out using a qualitative risk-based appraisal with reference to the locations of Ty du, Cae Canol-dydd and Cors Gwawr in relation to sensitive receptors, the planned process and site characteristics, as described in IAQM guidance [RD1].

2.1.3 IAQM guidance [RD1] aims to estimate the impacts of both PM_{10} and dust together, through a combined risk-based assessment procedure. IAQM guidance [RD1] provides a methodological framework, but notes that professional judgement is required to assess impacts. This assessment does not consider the air quality impacts of exposure to contaminated dust that could arise from the remediation of contaminated land. Although $PM_{2.5}$ is not specifically included as a parameter within the assessment, the risk levels associated with PM_{10} and any subsequent mitigation measures would also apply to $PM_{2.5}$ as $PM_{2.5}$ is included within the PM_{10} fraction.

2.2 Potential sources

2.2.1 The temporary and varied nature of construction or other processes which include similar emission sources differentiates it from other fugitive dust sources as to the estimation and control of emissions. The process usually consists of a series of different operations, each with its own duration and potential for dust generation. Dust emissions from any single site can be expected to have a definable beginning and end but would also vary between

the same types of activities. On large sites, the location and scale of potentially dust-generating activities would also vary throughout the works.

2.2.2 There are potentially sensitive locations close to or within the respective boundaries of the compensation sites including residential properties, Public Rights of Way and existing habitat sites with international, national and local designation that are sensitive to dust. Activities associated with the creation of the compensation sites have the potential to produce emissions of dust that could be transported towards receptors by the wind. These are close enough to the respective compensation sites that without mitigation measures, they could perceive increases in the rate of dust deposition to property surfaces.

2.2.3 The activities associated with the creation of the compensation sites are described in detail in section 1.2 of this appendix. The key potential construction dust emission sources associated with these activities are summarised below. Where possible, these have been assigned into the four categories used for the IAQM dust assessment [RD1] method of demolition, earthworks, construction and trackout. These are described below.

- Demolition activities: there are no demolition activities anticipated during the creation of the compensation sites.
- Earthworks: including topsoil stripping and re-landscaping. Further earthworks activities include scrub removal, the formation of topsoil storage mounds, drainage modifications and earthworks for establishing a temporary site compound at Cae Canol-dydd and Cors Gwawr. Another potential source is wind picking up dust from the storage mounds which could occur if the wind speed is high enough and the stored material is dry, friable and mitigation measures were not in place.
- Construction activities: including the erection of fencing and construction of a temporary site compound at Cae Canol-dydd and Cors Gwawr (to accommodate the storage of materials, equipment and welfare facilities).
- Vehicle movement and trackout: vehicles moving on and around the respective compensation sites, emitting exhaust particulate matter and re-suspending loose material on the road. There would be the potential for spillage from transferring material around the sites and from particulates being lifted from open container vehicles by the wind generated by vehicle movement. Material tracked out onto the local road network on the wheels of site traffic could be re-suspended by passing traffic.

2.2.4 The construction dust assessment comprises a qualitative risk-based appraisal of the potential sources of dust and the impacts at the sensitive locations close to the respective ecological compensation sites. Based on the calculated risk level, the IAQM guidance [RD1] sets out clear requirements for the recommended mitigation measures, which can be used to minimise the impact of dust during the construction phase of the development. The mitigation measures taken forward from this assessment are included as part of the air quality management strategies set out in the Wylfa Newydd Code of

Construction Practice (CoCP) (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

2.2.5 Larger dust particles (greater than 30µm) make up the greatest proportion of dust emission from mineral workings or earthworks and will largely deposit within 100m of sources [RD2]. Intermediate sized particles (10µm–30µm) are likely to travel further distance. PM_{10}, including the smaller $PM_{2.5}$ particulates are reported to make up a smaller proportion (approximately 10%) of dust emitted from most workings and the emissions become diluted as they disperse down-wind [RD3].

2.3 Baseline conditions

2.3.1 The assessment requires characterisation of the existing conditions with regard to PM_{10} concentrations to determine the sensitivity of the area. A PM_{10} concentration of 14.9µg/m^3 has been used in this assessment to represent the background concentration. This concentration was recorded by the IACC during 2016 at a location adjacent to the Wylfa Newydd Development Area approximately 2.7km west-southwest of Ty du, 18.4km northwest of Cae Canol-dydd and 20.7km northwest of Cors Gwawr.

2.3.2 The IACC also undertook measurements of dust deposition rates at several locations in the vicinity of the Wylfa Newydd Development Area in 2012, 2013 [RD4] and 2016 [RD5]. The measured dust deposition rates ranged from 25.8 to 35.8 milligrams per square metre per day (mg/m^2/day). These were reported by the IACC to be indicative of dust deposition rates for 'open country', and are well below the levels of dust deposition rate that could possibly affect amenity. Suggested guidelines for the dust deposition rate for when complaints are likely set out in *Suggested Guidelines for Deposited Ambient Dust* [RD6] and range from 140mg/m^2/day for open countryside to 200mg/m^2/day for residential areas and the outskirts of towns (based on a large number of UK measurements [RD6]). The value for indicating when complaints are likely, based on site-specific baseline measurement data in the vicinity of the Wylfa Newydd Development Area, would be lower than the 140mg/m^2/day value as the baseline measurements are generally lower than the UK-wide rural dataset. The measurements are also below the levels of dust deposition rates that could potentially affect sensitive vegetation [RD7].

2.3.3 The dust deposition measurements recorded in the vicinity of the Wylfa Newydd Development Area would be broadly representative of the dust deposition in most rural locations on Anglesey that are not close to specific sources of dust. As there are no significant sources of dust emissions near to the respective compensation sites, the dust deposition in the vicinity of the compensation sites would be expected to be similar to the rural measurements recorded in the vicinity of the Wylfa Newydd Development Area.

2.4 Local climatic conditions

2.4.1 Although not specifically required as part of the IAQM dust assessment method [RD1], analysis of the local climatic conditions was also undertaken to provide additional context to the risk assessment and assist in the determination of the sensitivity of the area.

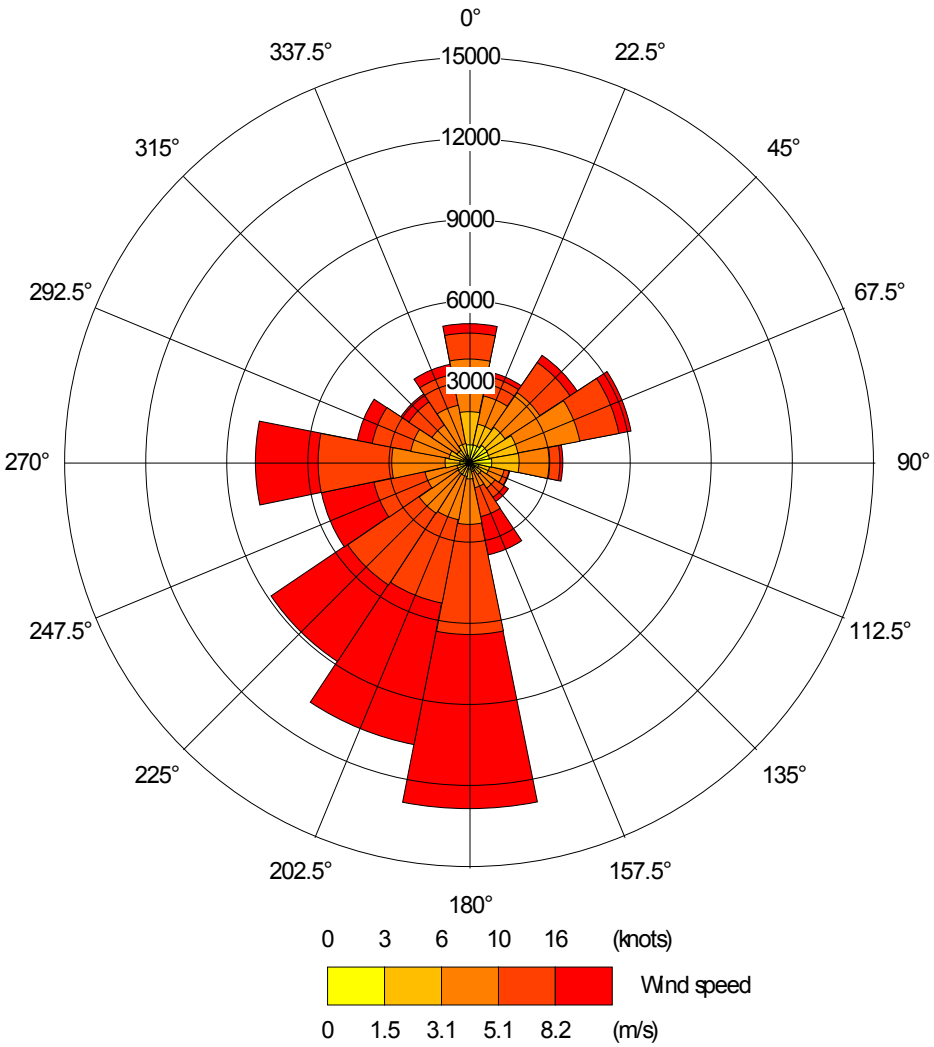
2.4.2 Local climatic conditions such as wind speed and precipitation (rainfall) would affect the probability of airborne dust occurring from potentially dusty activities or open areas and stockpiles and can also affect the dispersion of dust in the air. The wind direction is a useful parameter to understand the likelihood of effects occurring at sensitive locations if dust is emitted or becomes airborne and how severe its effects could potentially be.

2.4.3 Meteorological Office data covering the period 1 January 2007 to 31 December 2016 were obtained from the RAF Valley weather station and for the location of the Wylfa Newydd Development Area. The RAF Valley weather station is approximately 16.5km west-southwest of Cae Canol-dydd and 18.3km west-southwest of Cors Gwawr and meteorological data recorded at this station is considered to be broadly representative of the climatic conditions experienced at Cae Canol-dydd and Cors Gwawr. Meteorological Office data were obtained for the location of the Wylfa Newydd Development Area, based on the Numerical Weather Prediction (NWP) model. The Wylfa Newydd Development Area is approximately 2.7km west-southwest of Ty du and the data collected for this location is considered representative of the climatic conditions experienced at Ty du. The wind data and associated precipitation rate data for both RAF Valley and the Wylfa Newydd Development Area were examined to determine the frequency of occurrence of winds that blow towards receptor locations, strength of winds, and frequency of rainfall in order to evaluate the likelihood of sensitive receptors located in the vicinity of the assessed sites, being affected by fugitive dust emissions.

RAF Valley NWP data analysis

2.4.4 A wind rose for RAF Valley data for the period 1 January 2007 to 31 December 2016 is provided in figure 2-1. The wind rose plot shows the direction the wind blows from (wind sector), in five wind speed categories and the number of hours that it blows in each combination of speed and direction.

Figure 2-1 Wind rose – RAF Valley 2007–2016



2.4.5 Table 2-4 (below) tabulates the wind speed and direction data (based on hourly data) into 16 wind direction sectors, each of 22.5°, representing the commonly described wind directions (e.g. south (S) centred on 180°, south-southwest (SSW) centred on 202.5°, southwest (SW) centred on 225°, and so on). Table 2-5 (below) tabulates the wind speed and direction for dry periods (i.e. days with less than 1mm precipitation).

Table 2-4 RAF Valley data wind analysis (1 January 2007 to 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
0.5 – 5.0	4.2%	2.8%	3.3%	4.5%	3.4%	1.5%	1.3%	1.0%	2.3%	2.2%	2.2%	1.7%	2.9%	2.4%	1.7%	2.2%	39.5%
5.0 – 7.5	1.1%	0.8%	1.5%	1.6%	0.4%	0.2%	0.5%	0.9%	3.4%	2.7%	2.9%	1.8%	2.6%	1.5%	1.1%	1.3%	24.4%
7.5 – 10.0	0.4%	0.3%	0.6%	0.7%	0.2%	0.0%	0.2%	1.0%	3.8%	2.9%	2.5%	1.5%	2.0%	0.7%	0.5%	0.5%	17.7%
>10	0.2%	0.1%	0.1%	0.2%	0.0%	0.0%	0.1%	1.1%	5.2%	4.3%	2.5%	1.5%	1.6%	0.3%	0.2%	0.2%	17.6%
Total	6.1%	4.0%	5.5%	7.0%	4.0%	1.8%	2.0%	4.0%	14.7%	12.2%	10.1%	6.4%	9.1%	4.9%	3.5%	4.3%	99.6%

Note: 0.4% of the wind direction / speed data were not available

Table 2-5 RAF Valley data wind analysis during dry days (daily rainfall less than 1mm) (1 January 2007 – 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
0.5 – 5.0	3.4%	2.3%	2.8%	3.6%	2.3%	1.0%	0.8%	0.7%	1.6%	1.6%	1.6%	1.1%	2.0%	1.6%	1.3%	1.7%	29.4%
5.0 – 7.5	0.7%	0.7%	1.2%	1.2%	0.2%	0.1%	0.1%	0.4%	2.1%	1.8%	1.8%	1.0%	1.6%	0.9%	0.8%	1.0%	15.6%
7.5 – 10.0	0.2%	0.2%	0.4%	0.5%	0.1%	0.0%	0.1%	0.3%	1.8%	1.6%	1.3%	0.7%	0.9%	0.3%	0.2%	0.2%	9.0%
>10	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.2%	1.5%	1.6%	0.8%	0.5%	0.7%	0.1%	0.1%	0.1%	6.0%
Total	4.5%	3.1%	4.5%	5.4%	2.7%	1.1%	1.1%	1.6%	7.1%	6.6%	5.5%	3.3%	5.1%	3.0%	2.3%	3.1%	60.2%

2.4.6 Table 2-4 presents the frequency of winds as a percentage of all winds at RAF Valley between 2007 and 2016 for each 22.5° wind direction sector within specified wind speed bands. Table 2-4 and figure 2-1 illustrate that the most frequently occurring wind direction is from a southerly direction occurring for 14.7% of the time, with winds from a south-southwesterly direction also occurring frequently (12.2%). This indicates that receptors to the north or north-northeast of any activity generating dust emissions would have the highest probability of experiencing potential increases in dust deposition or PM_{10} concentrations.

2.4.7 The wind speed required to raise dust particles into the air from a surface, known as wind erosion, is dependent upon the size of the particle and other factors. In general, the higher the wind speed the greater the potential for the generation of airborne dust. It is generally accepted that wind erosion only becomes significant at wind speeds in excess of 5.0m/s at the surface based on a reference wind speed height at 10m. Table 2-4 shows that calm conditions (<0.5m/s) occur for approximately 0.3% of the time. Wind speeds between 0.5m/s and 5.0m/s occur for approximately 39.5% of the time, and wind speeds greater than 5.0m/s occur for 59.7% of the time.

2.4.8 However, the potential for dust to be emitted to air is higher during periods of extended dry weather. During periods of wet weather, dust emissions from surfaces would be decreased, as surfaces will be wet. Any coarse dust that becomes airborne would also be minimised through removal from the atmosphere through washout during periods of rainfall. When considering the lower potential for wind erosion to occur on days when it has been raining (assumed to be where the total rainfall in a day was 1mm or greater), table 2-4 shows that the percentage of time when the wind is above 5.0m/s and the conditions were dry is much lower, at approximately 30.6% of the time.

2.4.9 Table 2-6 displays an analysis of precipitation rate data between 2007 and 2016 for the RAF Valley weather station and indicates that dry hours occur for over two-thirds of the total hours considered from the 10 years of meteorological data considered.

Table 2-6 RAF Valley precipitation data analysis (1 January 2007 to 31 December 2016)

Precipitation rate (mm/hour)	Frequency
0	86.9%
0.1 - 0.5	7.2%
0.5 - 1.0	2.1%
1.0 - 1.5	1.5%
1.5 - 2.0	0.6%
2.0 - 2.5	0.5%
2.5 - 3.0	0.2%
>3.0	0.5%

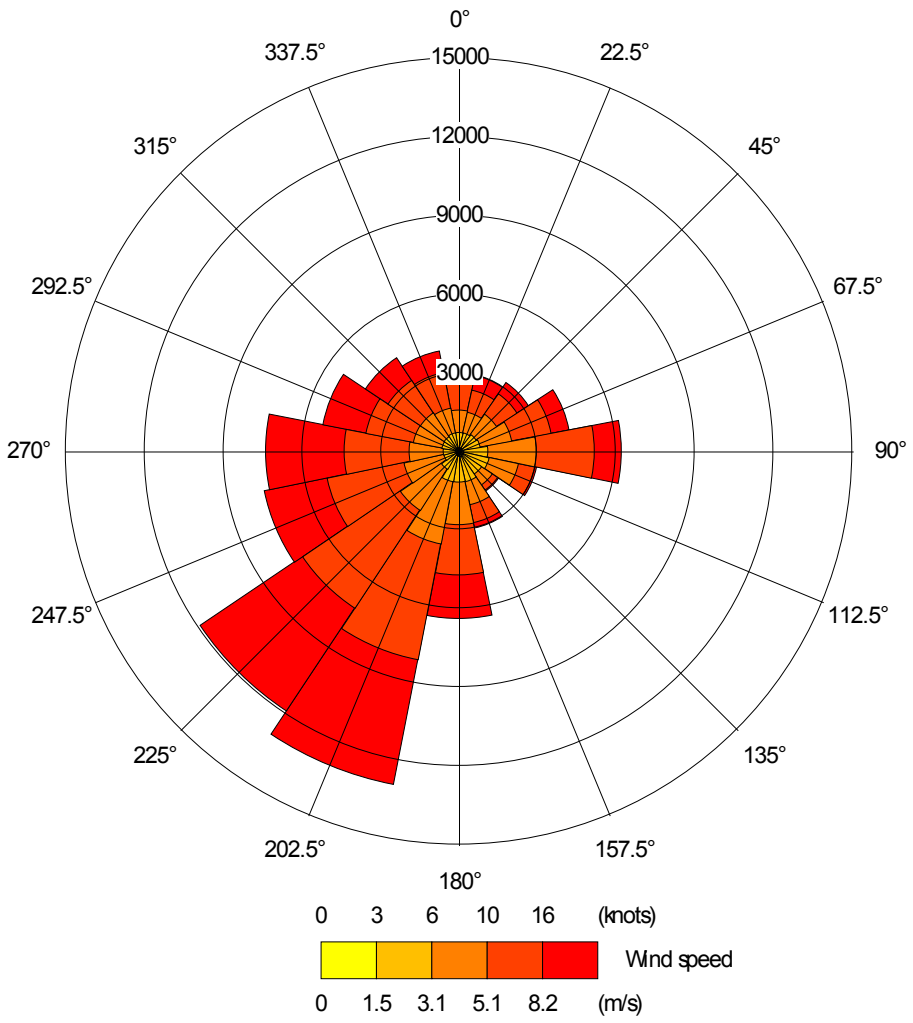
Note: 0.5% of the precipitation data were not available

2.4.10 Considering the above wind and rain analysis, the likelihood that the conditions which could lead to dust being emitted due to wind erosion when the wind speed is high enough (i.e. 5.0m/s or higher), and then transported in the air to nearby receptors is likely to be relatively low. For example, for the wind direction which occurs most frequently (i.e. south) the frequency of winds on dry days above 5.0m/s is only 5.4%, which equates to approximately 20 days in the year (see table 2-5).

Wylfa Newydd Development Area NWP data analysis

2.4.11 A wind rose for the Wylfa Newydd Development Area data for the period 1 January 2007 to 31 December 2016 is provided in figure 2-2.

Figure 2-2 Wind rose – Wylfa Newydd Development Area NWP 2007 - 2016



2.4.12 Table 2-7 tabulates the wind speed and direction data (based on hourly data) into the same 16 wind direction sectors as for the Wylfa Newydd Development Area dataset. Table 2-8 tabulates the wind speed and direction for dry periods (i.e. days with less than 1mm precipitation).

Table 2-7 Wylfa Newydd Development Area NWP data wind analysis (1 January 2007 to 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
0.5 – 5.0	1.7%	1.7%	1.9%	2.3%	3.2%	2.6%	1.8%	2.4%	3.1%	3.9%	2.9%	2.3%	2.0%	1.9%	1.9%	1.8%	37.5%
5.0 – 7.5	1.0%	0.8%	1.0%	1.5%	2.2%	0.7%	0.3%	0.7%	1.8%	4.2%	4.1%	2.8%	2.3%	1.7%	1.5%	1.4%	28.2%
7.5 – 10.0	0.5%	0.5%	0.5%	0.8%	1.1%	0.1%	0.1%	0.3%	1.4%	3.5%	3.5%	1.9%	1.9%	1.4%	0.9%	0.7%	19.1%
>10	0.3%	0.3%	0.3%	0.3%	0.5%	0.0%	0.0%	0.1%	1.0%	3.2%	3.1%	1.6%	2.1%	1.0%	0.6%	0.5%	14.8%
Total	3.6%	3.4%	3.7%	4.9%	7.1%	3.5%	2.1%	3.5%	7.3%	14.8%	13.6%	8.7%	8.4%	6.0%	4.9%	4.5%	100.0%

Table 2-8 Wylfa Newydd Development Area NWP data wind analysis during dry days (daily rainfall less than 1mm) (01 January 2007 – 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
0.5 – 5.0	1.4%	1.4%	1.6%	1.8%	2.4%	1.8%	1.1%	1.5%	2.0%	2.6%	1.9%	1.4%	1.3%	1.3%	1.5%	1.5%	26.4%
5.0 – 7.5	0.8%	0.7%	0.8%	1.2%	1.5%	0.4%	0.1%	0.2%	0.6%	2.3%	2.2%	1.4%	1.3%	1.1%	1.0%	1.0%	16.5%
7.5 – 10.0	0.4%	0.4%	0.4%	0.5%	0.7%	0.0%	0.0%	0.1%	0.3%	1.3%	1.4%	0.7%	0.8%	0.8%	0.5%	0.5%	8.7%
>10	0.2%	0.1%	0.1%	0.2%	0.3%	0.0%	0.0%	0.0%	0.1%	0.7%	0.9%	0.4%	0.8%	0.4%	0.3%	0.3%	4.8%
Total	2.8%	2.5%	2.8%	3.8%	4.9%	2.2%	1.2%	1.7%	3.0%	7.0%	6.4%	4.0%	4.2%	3.6%	3.3%	3.3%	56.7%

2.4.13 Table 2-7 presents the frequency of winds as a percentage of all winds between 2007 and 2016 for each 22.5° wind direction sector within specified wind speed bands. Table 2-7 illustrates that the most frequently occurring wind direction is from a south-southwest direction occurring for 14.8% of the time, with winds from a southwesterly direction occurring frequently (13.6%). This indicates that nearby receptors to the north-northeast or northeast of any construction activity which generated dust emissions would have the highest potential to experience increases in dust deposition or PM_{10} concentrations.

2.4.14 Table 2-7 shows that calm conditions (<0.5m/s) occur for approximately 0.3% of the time. Wind speeds between 0.5m/s and 5.0m/s occur for approximately 37.5% of the time, and wind speeds greater than 5.0m/s occur for 62.1% of the time.

2.4.15 When considering the lower potential for wind erosion to occur on days when it has been raining (assumed to be where the total rainfall in a day was 1mm or greater), table 2-8 shows that the percentage of time when the wind is above 5.0m/s and the conditions were dry is much lower, at 30% of the time.

2.4.16 Table 2-9 displays an analysis of precipitation rate data between 2007 and 2016 for the Wylfa Newydd Development Area and indicates that dry hours occur for over two-thirds of the total hours considered from the 10 years of meteorological data considered.

Table 2-9 Wylfa Newydd Development Area NWP precipitation data analysis (01 January 2007 to 31 December 2016)

Precipitation rate (mm/hour)	Frequency
0	72.2%
0.1 - 0.5	21.5%
0.5 - 1.0	2.4%
1.0 - 1.5	1.3%
1.5 - 2.0	0.8%
2.0 - 2.5	0.6%
2.5 - 3.0	0.3%
>3.0	1.0%

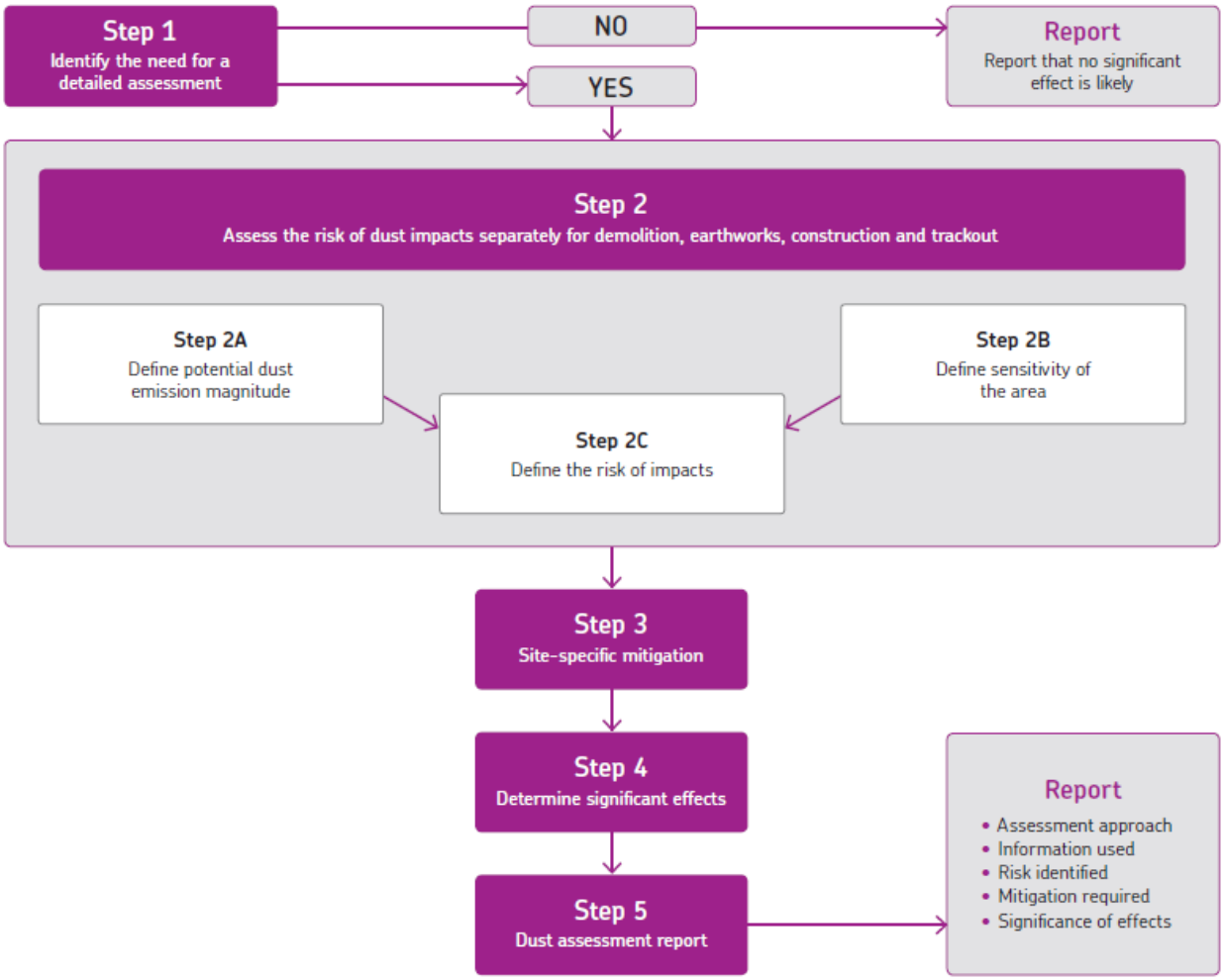
2.4.17 Considering the above wind and rain analysis, the likelihood that the conditions which could lead to dust being emitted due to wind erosion when the wind speed is high enough (i.e. 5.0m/s or higher), and then transported in the air to nearby receptors is likely to be relatively low. For example, for the wind direction which occurs most frequently (i.e. south-southwest) the frequency of winds on dry days above 5.0m/s is only 4.3%, which equates to approximately 16 days in the year (see table 2-8).

2.5 IAQM assessment methodology

Outline of method

2.5.1 The methodology for the assessment of construction impacts is based on a five-step approach as set out in figure 2-3.

Figure 2-3 Structure of construction dust assessment



Step 1 Identify the need for a detailed assessment

2.5.2 An assessment is required where there is:

- a human receptor within 350m of the respective boundaries of the compensation sites and/or within 50m of the respective access route(s) used by construction vehicles on the public highway, up to 500m from the respective site entrance(s); and/or
- an ecological receptor within 50m of the respective boundaries of the compensation sites and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the respective site entrance(s).

The requirement for a dust risk assessment can be screened out where the criteria above are not met, therefore it can be concluded that the level of risk

is Negligible and any effects would be not significant. If there are human or ecological receptors within the distance criteria set out in Step 1, then Steps 2 to 4 should be undertaken, as shown in figure 2-3.

Step 2 Assess the risk of dust impacts

Step 2A Define the potential dust emission magnitude at Ty du, Cae Canol-dydd and Cors Gwawr

Demolition

2.5.4 The following are descriptors for the different dust emission magnitudes for demolition.

Large: total building volume greater than 50,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities greater than 20m above ground level.

Medium: total building volume 20,000m^3 to 50,000m^3, potentially dusty construction material, demolition activities 10m to 20m above ground level.

Small: total building volume less than 20,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities less than 10m above ground, demolition during wetter months.

Earthworks

2.5.5 The following are descriptors for the different dust emission magnitudes for earthworks.

Large: total site area greater than 10,000m^2, potentially dusty soil type (e.g. clay, which would be prone to suspension when dry due to small particle size), more than 10 heavy earth-moving vehicles active at any one time, formation of bunds greater than 8m in height, total material moved greater than 100,000 tonnes.

Medium: total site area 2,500m^2 to 10,000m^2, moderately dusty soil type (e.g. silt), five to 10 heavy earth-moving vehicles active at any one time, formation of bunds 4m to 8m in height, total material moved 20,000 tonnes to 100,000 tonnes.

Small: total site area less than 2,500m^2, soil type with large grain size (e.g. sand), less than five heavy earth moving vehicles active at any one time, formation of bunds less than 4m in height, total material moved less than 20,000 tonnes, earthworks during wetter months.

Construction

2.5.6 The following are descriptors for the different dust emission magnitudes for construction.

Large: total building volume greater than 100,000m^3, piling, on-site concrete batching; sandblasting.

Medium: total building volume 25,000m^3 to 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on-site concrete batching.

Small: total building volume less than 25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

2.5.7 Trackout refers to the transport of dust and dirt from the respective compensation sites onto the public road network, where it may be deposited and re-suspended by other vehicles using the road network. Only receptors within 50m of the route(s) used by vehicles on the public highway up to 500m from the respective site entrance(s) are considered to be at risk.

2.5.8 The following are descriptors for the different dust emission magnitudes for trackout.

Large: greater than 50 HDV outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length greater than 100m.

Medium: 10 to 50 HDV outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m to 100m.

Small: fewer than 10 HDV outward movements in any one day, surface material with low potential for dust release, unpaved road length less than 50m.

Step 2B Define the sensitivity of the area for Ty du, Cae Canol-dydd and Cors Gwawr

2.5.9 The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- the local background PM_{10} concentrations; and
- site-specific factors.

2.5.10 For this assessment of the sensitivities of people to dust soiling effects and to the health effects of PM_{10}, the receptors have been identified as 'High', 'Medium' or 'Low' sensitivity based on Box 6 in the IAQM guidance [RD1] as reproduced below.

Sensitivities of people to dust soiling effects

High:

- users can reasonably expect the enjoyment of a high level of amenity; or

- the appearance, aesthetics or value of their property would be diminished by soiling, and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.

Medium:

- users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their homes;
- the appearance, aesthetics or value of their property would be diminished by soiling; or
- the people or property would not reasonably be expected to be present continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative examples include parks and places of work.

Low:

- the enjoyment of amenity would not reasonably be expected;
- property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or
- there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods as part of the normal pattern of use of the land.

Indicative examples include playing fields, farmland (unless it is commercially-sensitive horticultural farmland), footpaths, short-term car parks and roads.

Sensitivities of people to the health effects of PM_{10}

High:

- locations where members of the public are exposed over a period relevant to the Air Quality Objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).

Indicative examples include residential properties. Hospitals, schools and residential care homes (if present) should also be considered as having equal sensitivity to residential areas for the purpose of this assessment.

Medium:

- locations where the people exposed are workers, and exposure is over a period relevant to the Air Quality Objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).

Indicative examples may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

Low:

- locations where human exposure is transient.

Indicative examples include public footpaths, playing fields, parks and shopping streets.

Sensitivities of receptors to ecological effects

2.5.11 For the assessment of the sensitivity of the area with regard to impacts on ecological receptors, the relevant ecological receptors have been identified as High, Medium or Low sensitivity as advised in the IAQM guidance [RD1], as described below.

High:

- locations with an international or national designation and the designated features may be affected by dust soiling; or
- locations where there is a community of a particularly dust-sensitive species such as vascular species included in the Red Data List for Great Britain [RD8].

Indicative examples include a SAC designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium:

- locations where there are particularly important plant species, where dust sensitivity is uncertain or unknown; or
- locations with a national designation where the features may be affected by dust deposition.

An indicative example is a SSSI with dust-sensitive features.

Low:

- locations with a local designation where the features may be affected by dust deposition.

An indicative example is a Wildlife Site with dust sensitive features.

2.5.12 Table 2-10 and table 2-11 set out the selection criteria for the sensitivity of the area to dust soiling effects on people and property, and the selection criteria for the sensitivity of the area to human health impacts, respectively. Table 2-12 sets out the selection criteria for the sensitivity of the area with regard to impacts on ecological receptors.

Table 2-10 Criteria for the sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 2-11 Criteria for the sensitivity of the area to human health

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	> 32µg/m^3	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 – 32µg/m^3	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 – 28µg/m^3	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	< 24µg/m^3	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	> 32µg/m^3	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 – 32µg/m^3	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 – 28µg/m^3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	< 24µg/m^3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	n/a	>1	Low	Low	Low	Low	Low

Table 2-12 Criteria for the sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C Define the risk of impacts

2.5.13 The dust emission magnitude is then combined with the sensitivity of the area to determine the risk of impacts with no mitigation measures applied. The matrices in table 2-13 provide a method of assigning the level of risk for each activity. These can then be used to determine the level of mitigation that is required.

Table 2-13 Determination of risk of dust impacts

Sensitivity	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible
Low	Low risk	Low risk	Negligible

Step 3 Site-specific mitigation

2.5.14 During the construction phase, it would be important to control dust levels for High, Medium and Low risk construction activities. In order to avoid significant impacts from dust during the construction phase, suitable mitigation measures should be adopted. Following the identification of the overall risk category for the demolition, earthworks, construction and trackout activities based on table 2-13, appropriate mitigation measures can be identified for the creation of the compensation sites. Activities identified as a High risk would require a greater level of mitigation than those identified as Low risk.

2.5.15 A selection of these measures has been specified for Low risk to High risk sites in the IAQM guidance [RD1] as measures suitable to mitigate dust emissions from activities such as those which would be undertaken during the creation of the compensation sites at Ty du, Cae Canol-dydd and Cors Gwawr.

Step 4 Determine significant effects

2.5.16 Following Step 2 (determining the risk of dust impacts for each activity) and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust effects can be determined. The recommended mitigation measures are considered to be sufficient based on the successful application

of these measures at other large construction sites to reduce emissions of dust, such that a significant effect would not occur at off-site receptors.

2.5.17 The approach in Step 4 of the IAQM dust assessment guidance [RD1] has been adopted to determine the significance of effects with regard to dust emissions. The guidance states the following:

"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be not significant."

2.5.18 The IAQM guidance also states that:

"Even with a rigorous DMP [Dust Management Plan] in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects will be not significant."

2.5.19 Step 4 of the IAQM guidance [RD1] recognises that the key to the above approach is that it assumes that the regulators, such as the IACC and NRW, ensure that the proposed mitigation measures are implemented. The management plan should include the necessary systems and procedures to facilitate regular checking by the regulators to ensure the mitigation is being delivered, and that it is effective at reducing any residual effect to not significant in line with the guidance.

3 Step 1 Identify the need for a detailed assessment

3.1.1 An assessment of potential demolition and construction impacts was undertaken in accordance with the IAQM methodology described earlier and as set out in section 2. The first step is Step 1, where the need for a detailed assessment is determined based on the location of receptors within the vicinity of the respective compensation sites.

3.1.2 There are human receptors (i.e. residential properties or commercial premises, etc.) within 350m of the respective boundaries of the compensation sites and, therefore, further assessment is required. There are also human receptors within 50m of the local road network, up to 500m from the respective site entrance(s), which would be utilised during the works. A count of the relevant human receptors within the specified assessment bands (i.e. up to 20m, 50m, 100m and 350m from the construction site boundary (see figures 4, 5 and 6) or up to 20m and 50m of the likely route used by construction traffic) was carried out as recommended in IAQM guidance [RD1], the results of which are set out below for each compensation site (i.e. Ty du, Cae Canol-dydd and Cors Gwawr). The receptors have been identified as being of High, Medium or Low sensitivity as per the criteria set out in paragraph 2.5.10.

3.1.3 The effects of construction dust on ecological sites have also been considered. The presence of any ecological receptors within 50m of the respective boundaries of the compensation sites is discussed within this section of the report, together with a description of the ecological site, and its potential sensitivity to dust soiling, in accordance with Step 2B.

3.2 Ty du

3.2.1 A count of the relevant human receptors within the specified assessment bands was carried out as recommended in IAQM guidance [RD1], the results of which are set out in table 3-4. The relevant receptors within the assessment bands are shown on figure 6.

3.2.2 It should be noted there is a public footpath within the boundary of the proposed compensation site at Ty du and five public footpaths within 350m of the boundary of the site. These have been included in the receptor count as having Low sensitivity as per IAQM guidance [RD1].

Table 3-4 Dust soiling and human health receptor count

Receptor count				
Demolition, earthworks and construction		Receptor sensitivity		
		High	Medium	Low
Distance from the Ty du site boundary	<20m	0	0	1
	<50m	0	0	1
	<100m	3	0	1
	<350m	12	2	5
Trackout		High	Medium	Low
Distance from roads up to 500m from the Ty du site exit	<20m	3	0	1
	20m–50m	0	0	0

3.2.3 The proposed Ty du compensation site forms part of the Tir Lleidiog Ty du Wildlife Site and is considered in this assessment. As per IAQM guidance [RD1], the Wildlife Site would normally be considered a Low sensitivity ecological receptor. However, due to the presence of bryophyte communities which may be affected by dust soiling, the Wildlife Site is considered a Medium sensitivity ecological receptor.

3.2.4 The next nearest relevant ecological receptor is Arfordir Trwyn y Buarth – Porth Wen Wildlife Site which is approximately 350m northeast of the site.

3.3 Cae Canol-dydd

3.3.1 The human receptors within the assessment bands around the Cae Canol-dydd construction boundary and trackout route are set out in table 3-5. The relevant receptors within the assessment are shown on figure 4.

3.3.2 It should be noted there is a public footpath within the boundary of the proposed compensation site at Cae Canol-dydd and three public footpaths within 350m of the boundary of the site. These have been included in the receptor count as having Low sensitivity as per IAQM guidance [RD1].

Table 3-5 Dust soiling and human health receptor count

Receptor count				
Demolition, earthworks and construction		Receptor sensitivity		
		High	Medium	Low
Distance from the Cae Canol-dydd site boundary	<20m	2	0	1
	<50m	2	0	1
	<100m	2	0	2
	<350m	12	0	3
Trackout		High	Medium	Low
Distance from roads up to 500m from the Cae Canol-dydd site exit	<20m	4	1	0
	20-50m	0	0	0

3.3.3 The proposed Cae Canol-dydd compensation site lies adjacent to and connects part of the Caeau Talwrn SSSI and Corsydd Môn/Anglesey Fens SAC. These sites will therefore be considered in the assessment.

3.3.4 As per IAQM guidance [RD1], Caeau Talwrn SSSI has been designated a Medium sensitivity and Corsydd Môn/Anglesey Fens SAC is considered a High sensitivity ecological receptor.

3.3.5 The next nearest ecological receptor is Clegyrdy Bach/Neuadd Wen/Ty'n Beudy Wildlife Site which is approximately 160m southeast of the site.

3.4 Cors Gwawr

3.4.1 A count of the relevant human receptors within the specified assessment bands was carried out as recommended in IAQM guidance [RD1], the results of which are set out in table 3-6. The relevant receptors within the assessment bands are shown on figure 5.

3.4.2 It should be noted there is a public footpath within the boundary of the proposed compensation site at Cors Gwawr and seven public footpaths within 350m of the boundary of the site. These have been included in the receptor count as having Low sensitivity as per IAQM guidance [RD1].

Table 3-6 Dust soiling and human health receptor count

Receptor count				
Demolition, earthworks and construction		Receptor sensitivity		
		High	Medium	Low
Distance from the Cors Gwawr site boundary	<20m	0	0	1
	<50m	0	0	1
	<100m	4	0	1
	<350m	72	4	7
Trackout		High	Medium	Low
Distance from roads up to 500m from the Cors Gwawr 5 site exit	<20m	6	0	1
	20m–50m	1	0	0

3.4.3 The proposed Cors Gwawr compensation site is adjacent to the Cors Bodeilio SSSI, Anglesey and Llyn Fens Ramsar and Corsydd Môn/Anglesey Fens SAC, Caeau Talwrn SSSI and Tir Pori Talwrn Wildlife Site. These sites will therefore be considered in the assessment.

3.4.4 As per IAQM guidance [RD1], Cors Bodeilio SSSI and Caeau Talwrn SSSI have been designated a Medium sensitivity and Anglesey and Lyn Fens Ramsar and Corsydd Môn/Anglesey Fens SAC are considered a High sensitivity ecological receptor. Tir Pori Talwrn Wildlife Site is considered a Low sensitivity receptor.

3.4.5 The next nearest ecological receptor is a parcel of ancient woodland (ID 10613) approximately 750m southeast of the site.

4 Step 2 Assess the risk of dust impacts

4.1 Step 2A Define the potential dust emission magnitude

4.1.1 The creation of the compensation sites would be split into several stages, which would involve different periods of demolition, earthworks, construction and trackout, and activity levels would not necessarily peak simultaneously.

4.1.2 The dust emission magnitudes of each activity have been specified using the definitions of dust emission magnitudes in section 2.5 and using professional judgement in line with IAQM guidance [RD1]. These are provided below for each compensation site. Table 4-4 presents a summary of all the dust emission magnitudes determined for each activity and each compensation site. These are based on the criteria set out in section 2.5.

Ty du

Demolition: The site encompasses areas of species-rich mire and scrub. There are no demolition activities anticipated during the creation of the compensation site. Therefore, demolition activities are not considered further in this assessment.

Earthworks: Earthworks related activities are limited to scrub clearance only. As dust-generating activities such as topsoil removal and formation of storage mounds are not anticipated, earthworks activities are not considered further in this assessment.

Construction: There are no construction activities anticipated during the creation of the compensation site. Therefore, construction activities are not considered further in this assessment.

Trackout: The absence of demolition and construction activities and the limited earthworks activities anticipated means the number of outward movements of HDVs in any one day is likely to be negligible. Therefore, trackout activities are not considered further in this assessment.

4.1.3 The limited and small-scale dust-generating activities anticipated during the compensation works at Ty du means the effects of dust associated with the creation of the compensation site at Ty du is not considered further.

Cae Canol-dydd

Demolition: The site encompasses rich-fen habitat and areas of improved pasture. There are no demolition activities anticipated during the creation of the compensation site at Cae Canol-dydd. Therefore, demolition activities are not considered further in this assessment.

Earthworks: Earthworks activities include topsoil stripping, re-landscaping in order to lower the land level, drainage modifications to reverse the artificial drainage of the site including the redirection of a stream adjacent to the eastern boundary, mound formation and site establishment. The total material moved comprising topsoil stripping and formation of three topsoil storage mounds (at a maximum height of 2m) is likely to be approximately 23,000m^3, but as the material would be first excavated, and secondly placed we have assumed that the volume handled is double this figure at 46,000m^3. Assuming a density of 1.6g/cc (which is appropriate for a mineral soil, but could be less for peat soils) this is equivalent to about 74,000 tonnes. This range is within the medium threshold of 20,000 – 100,000 tonnes total material moved as set out in the IAQM guidance [RD1]. The soil profile in some areas of Cae Canol-dydd comprises a clayey soil which may be prone to suspension when dry due to small particle size. The site area for the proposed works at Cae Canol-dydd is approximately 255,000m^2. However, the earthworks activities equate to the tonnage for a Medium dust emission magnitude. Therefore, on balance, the assessment for earthworks is based on a dust emission class of 'Medium'.

Construction: Construction activities include the construction of a relatively small temporary site compound and fencing to exclude stock from the designated habitat creation areas. As minimal construction activities with limited dust-generating potential are anticipated, the effects of dust from construction activities are not considered further in this assessment.

Trackout: During the construction phase, the maximum number of daily outward movements of HDVs is anticipated to be less than 10 in any one day. On this basis, the assessment for trackout is based on a dust emission class of 'Small'.

Cors Gwawr

Demolition: The site encompasses areas of pasture and degraded fen vegetation. There are no demolition activities anticipated during the creation of the compensation site at Cors Gwawr. Therefore, demolition activities are not considered further in this assessment.

Earthworks: Earthworks activities include topsoil stripping, scrub clearance, re-landscaping, drainage modifications including the diversion of a stream/ditch along the southern boundary, mound formation and site establishment. The total material moved comprising topsoil stripping and

formation of the storage mounds (at a maximum height of 2m) is likely to be approximately 16,500m^3, but as the material would be first excavated, and secondly placed, we have assumed that the volume handled is double this figure at 33,000m^3. Assuming a density of 1.6g/cc (which is appropriate for a mineral soil, but could be less for peat soils) this is equivalent to about 53,000 tonnes. This is within the medium threshold of 20,000 – 100,000 tonnes total material moved as set out in the IAQM guidance [RD1]. The soil profile in some areas of Cae Canol-dydd comprises a clayey soil which may be prone to suspension when dry due to small particle size. The site area for the proposed works at Cors Gwawr is approximately 278,000m^2. However, the earthworks activities equate to the tonnage for a Medium dust emission magnitude. Therefore, on balance, the assessment for earthworks is based on a dust emission class of 'Medium'.

Construction: Construction activities include the construction of a relatively small temporary site compound and fencing to exclude stock from the habitat creation areas. As minimal construction activities with limited dust-generating potential are anticipated, the effects of dust from construction activities are not considered further in this assessment.

Trackout: During the construction phase, the maximum number of daily outward movements of HDVs is anticipated to be less than 10 in any one day. On this basis, the assessment for trackout is based on a dust emission class of 'Small'.

Summary of dust emission magnitudes

4.1.4 Table 4-4 presents the dust emission magnitudes for each activity for the creation of compensation sites at Cae Canol-dydd and Cors Gwawr based on the criteria set out in section 2.5.

Table 4-4 Dust emission magnitude

Activity	Dust emission magnitude	
	Cae Canol-dydd	Cors Gwawr
Demolition	N/A	N/A
Earthworks	Medium	Medium
Construction	N/A	N/A
Trackout	Small	Small

4.2 Step 2B Define the sensitivity of the area

4.2.1 Cae Canol-dydd is bounded by areas of improved grassland for grazing sheep and cattle. The B5110 lies approximately 150m west of the site. There are two residential properties within 20m of the western boundary of the site. When defining the sensitivity of the area, consideration has been given to the proposed location of one of the topsoil storage mounds in close proximity to these residential properties. Furthermore, a PRoW passes directly through the site. The hourly sequential meteorological data as described in section 2.4 show that the most frequently occurring wind direction is from the south and south-southwest. This means that, on average, receptors to the north and north-northeast of Cae Canol-dydd would be most susceptible to any potential fugitive dust emissions from the activities as described in section 4.1.

4.2.2 Cors Gwawr is bounded by land used for grazing cattle and sheep with minor roads lying adjacent to the southern and western boundaries. The village of Talwrn lies approximately 200m northwest of the site. A PRoW passes directly through the site. The hourly sequential meteorological data as described in section 3.4 shows that receptors to the north and north-northeast of Cors Gwawr would be most susceptible to any potential fugitive dust emissions from the activities as described in section 5.1.

4.2.3 Table 4-5 displays the sensitivities of the surrounding area to demolition, earthworks, construction and trackout based on the criteria set out in table 2-10 and table 2-11, numbers of receptors within certain distance bands of the boundary of the assessed sites (see table 3-4 to table 3-6) and existing PM_{10} concentrations. The IAQM guidance [RD1] recommends that the receptor distance is based on the distance from the source rather than the site boundary. This assessment was undertaken on the basis that all activities (i.e. demolition, earthworks, construction and trackout) take place at the construction boundary of each assessed compensation site. This represents a conservative assumption, as in practice most activities would not take place at the site boundary, thus increasing the distance between the source and the receptor.

Table 4-5 Sensitivity of the area for human receptors at the assessed compensation sites

Compensation site	Potential impact	Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
Cae Canol-dydd	Dust soiling	N/A	Medium	N/A	Medium
	Human health		Low		Low
Cors Gwawr	Dust soiling		Low		Medium
	Human health		Low		Low

4.2.4 Table 4-5 shows that, based on the number of receptors within proximity of the assessed compensation sites and the background PM_{10} concentration, the sensitivity of the area for dust soiling impacts is generally Medium for all assessed activities with the exception of earthworks activities at Cors Gwawr which is considered a Low sensitivity. The sensitivity of human receptors to demolition and construction activities is categorised as "N/A" as there are no demolition and construction activities anticipated during the creation of the compensation sites at Cae Canol-dydd and Cors Gwawr.

4.2.5 Table 4-6 displays the sensitivities of the assessed ecological receptors to demolition, earthworks, construction and trackout activities based on the proximity of the respective site and the value of the site's ecological assets and in line with the IAQM guidance [RD1].

Table 4-6 Sensitivity of the assessed ecological sites

Compensation site	Ecological site	Sensitivity of the ecological sites			
		Demolition	Earthworks	Construction	Trackout
Cae Canol-dydd	Corsydd Môn/Anglesey Fens SAC	N/A	High	N/A	N/A
	Caeau Talwrn SSSI		Medium		
Cors Gwawr	Anglesey and Llyn Fens Ramsar		High		
	Corsydd Môn/Anglesey Fens SAC		High		
	Caeau Talwrn SSSI		Medium		Medium
	Cors Bodeilio SSSI		Medium		N/A
	Tir Pori Talwrn Wildlife Site		Low		Low

4.2.6 The sensitivity of the SSSI and SAC designated sites are classed as Medium and High sensitivity. Dust could affect sensitive vegetation such as lichens and bryophytes where these are present at the sites. The sensitivity of ecological receptors to demolition and construction activities is categorised as "N/A" as there are no demolition and construction activities anticipated during

the creation of the compensation sites at Cae Canol-dydd and Cors Gwawr. The sensitivity to trackout activities is categorised as "N/A" for some of the ecological receptors as these specific ecological receptors are not within 50m of the respective site boundaries and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the respective site entrance(s).

4.3 Step 2C – Define the risk of impacts

4.3.1 Using the dust emission magnitudes for the various activities in table 4-4 and the sensitivity of the area provided in table 4-5, the risks associated with each activity are provided in table 4-7 for dust soiling and human health impacts and table 4-8 for impacts on ecological sites.

Table 4-7 Dust risk at human receptors

Compensation site	Potential impact	Risk			
		Demolition	Earthworks	Construction	Trackout
Cae Canol-dydd	Dust soiling	N/A	Medium risk	N/A	Negligible risk
	Human health		Low risk		Negligible risk
Cors Gwawr	Dust soiling	N/A	Low risk	N/A	Negligible risk
	Human health		Low risk		Negligible risk

4.3.2 The results in table 4-7 indicate that, for potential dust soiling impacts at Cae Canol-dydd, there is predicted to be a medium risk from earthworks activities and a negligible risk from trackout activities. At Cors Gwawr, there is predicted to be a Low risk from earthworks activities and a Negligible risk from trackout activities. For human health impacts at both Cae Canol-dydd and Cors Gwawr, there is predicted to be a Low risk from earthworks activities and a Negligible risk from trackout activities. It would therefore be necessary to adopt an appropriate level of good practice mitigation measures to reduce the risks of causing a significant effect to amenity or human health.

Table 4-8 Summary of the dust risks for ecological sites

Compensation site	Potential impact	Risk			
		Demolition	Earthworks	Construction	Trackout
Cae Canol-dydd	Corsydd Môn/Anglesey Fens SAC	N/A	Medium risk	N/A	N/A
	Caeau Talwrn SSSI		Medium risk		
Cors Gwawr	Anglesey and Llyn Fens Ramsar	N/A	Medium risk	N/A	N/A
	Corsydd Môn/Anglesey Fens SAC		Medium risk		
	Caeau Talwrn SSSI		Medium risk		Negligible risk
	Cors Bodeilio SSSI		Medium risk		N/A
	Tir Pori Talwrn Wildlife Site		Low risk		Negligible risk

4.3.3 The results in table 4-8 indicate that for the assessed ecological receptors in the vicinity of Cae Canol-dydd, there would potentially be a Medium risk predicted for the potential impacts from earthwork activities.

4.3.4 For the assessed ecological receptors in the vicinity of Cors Gwawr, there would potentially be a Medium risk predicted for the potential impacts from earthworks activities with the exception of Tir Pori Talwrn Wildlife Site where a Low risk is predicted. For trackout activities, there is a Negligible risk predicted at Caeau Talwrn SSSI and Tir Pori Talwrn Wildlife Site.

4.3.5 It would therefore be necessary to put mitigation measures in place to reduce the potential ecological impacts due to the proposed activities at the assessed ecological compensation sites.

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5 Step 3 Compensation sites: specific mitigation

5.1 Recommended mitigation measures

5.1.1 The results in section 4 of this report indicate that the creation of the compensation sites at Cae Canol-dydd and Cors Gwawr are a Medium and Low risk respectively, for dust soiling impacts at sensitive human receptors and a Low risk for human health impacts. For the ecological receptors, there would be a Low to Medium risk for dust soiling affecting vegetation. Good practice mitigation measures would be needed to reduce the potential for dust emissions to lead to significant effects in the vicinity of the compensation sites at Cae Canol-dydd and Cors Gwawr. The suggested good practice mitigation measures which should be adopted for the compensation sites are set out below. Although not a requirement as per IAQM guidance [RD1], consideration for the adoption of measures during the works at Ty du should be considered as normal good practice, where they are relevant to the works being undertaken, as specified in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

5.1.2 The mitigation measures have been derived from those specified in the IAQM guidance [RD1] and where possible at this stage, adapted to the activities associated with creation of the compensation sites. Measures such as those specified in the guidance would normally be sufficient to reduce construction dust nuisance, risks to human health or effects on ecological sites to a not significant effect. These measures are listed in table 5-4 to table 5-9 with a recommendation as to whether or not they should be applied based on the risk levels identified in the dust assessment. Some specific comments or observations have been added or amendments to the text undertaken, where appropriate. Some of the mitigation measures listed within IAQM guidance for trackout (mitigation numbers 44, 46, 47 and 48) were considered to represent general on-site activities and operation of haul roads, and were moved to the 'Operations' section (see table 5-5) of the general mitigation measures required for all sites. The general mitigation measures were specified based on the highest risk category (i.e. based on the Medium risk to human and ecological receptors from dust soiling) as recommended by IAQM guidance [RD1]. For specific mitigation relating to trackout, the Low risk category was used to determine the mitigation as a conservative approach. It may not be necessary to adopt all the good practice mitigation measures set out below at the compensation sites (i.e. for those sites where the risks were found to be negligible or low, see table 4-7).

5.1.3 As specified above, the measures to control dust emissions taken forward from this assessment, derived from the highly recommended or desirable measures (see table 5-4 to table 5-9) and the monitoring of the effectiveness of the mitigation, would be included in the air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). These would be delivered during the construction works required for the creation of the ecological compensation sites.

5.1.4 When applying the mitigation measures, IAQM guidance [RD1] states the following:

"The most important aspects of the Dust Management Plan are assigning responsibility for dust management to an individual member of staff of the principal contractor, training staff to understand the importance of the issue, and communicating with the local community. Good dust management practices implemented at high risk sites have resulted in no or minimal complaints, which illustrates the value of the recommended approach."

5.1.5 The mitigation measures set out in table 5-4 to table 5-9 do not specifically include assigning responsibility for dust management to a staff member or training staff on the importance of dust management and awareness of dust issues. However, these would be included within the proposed mitigation measures.

Table 5-4 Mitigation for the overall scheme: communications

Mitigation measure	Overall recommendation Highly recommended / Desirable / Not required
1. Develop and implement a stakeholder communications plan that includes community engagement before work commences on the respective compensation sites.	Highly recommended
2. Display the name and contact details of person(s) accountable for air quality and dust issues on the respective compensation site boundaries. This may be the environment manager/engineer or the site manager.	Highly recommended
3. Display the head or regional office contact information.	Highly recommended Display the Horizon Enquiries number

Table 5-5 Mitigation for the compensation sites

Mitigation measure	Overall recommendation Highly recommended / Desirable / Not required
4. Develop dust mitigation and control measures as part of the air quality management strategy as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7) and implement these on-site through an appropriate management plan which is derived from the approved Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). This may also include measures to control other pollutant emissions. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this assessment. The desirable measures should be included as appropriate for the respective compensation sites.	Highly recommended
Site management	
5. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	Highly recommended
6. Make the complaints log available to the local authority when asked.	Highly recommended
7. Record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site, and the action taken to resolve the situation in the log book.	Highly recommended
8. Hold regular liaison meetings with other high-risk construction sites within 500m of the respective compensation sites, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	Not required
Monitoring	
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the respective compensation site boundaries, with cleaning to be provided if necessary.	Desirable

Mitigation measure	Overall recommendation Highly recommended / Desirable / Not required
10. Carry out regular site inspections to monitor compliance with the management plan, record inspection results and make an inspection log available to the local authority when asked.	Highly recommended
11. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly recommended
12. Agree dust deposition, dust flux or real-time PM_{10} continuous monitoring locations with the local authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if at a large site, before work on a phase commences. Further guidance is provided by the IAQM [RD9] on monitoring during demolition, earthworks and construction.	Highly recommended
Preparing and maintaining the site	
13. Plan site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible.	Highly recommended
14. Erect solid screens or barriers around dusty activities, or the respective compensation site boundaries, which are at least as high as any stockpiles on site.	Highly recommended
15. Fully enclose site or specific operations where there is a high potential for dust production and the respective compensation site boundaries are active for an extensive period.	Highly recommended
16. Avoid site runoff of water or mud.	Highly recommended
17. Keep the respective compensation sites fencing, barriers and scaffolding clean using wet methods.	Highly recommended
18. Remove materials that have a potential to produce dust from the respective compensation site as soon as possible, unless being reused on site. If they are being reused on-site, cover as described below.	Highly recommended
19. Cover, seed or fence stockpiles to prevent wind whipping.	Highly recommended
Operating vehicles/machinery and sustainable travel	
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly recommended
22. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Highly recommended

Mitigation measure	Overall recommendation Highly recommended / Desirable / Not required
23. Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Desirable
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Highly recommended
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car sharing).	Desirable
Operations	
26. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Highly recommended
27. Ensure an adequate water supply on the respective compensation site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Highly recommended
28. Use enclosed chutes and conveyors and covered skips.	Highly recommended
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly recommended
30. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	Highly recommended
44. Avoid dry sweeping of large areas.	Highly recommended
46. Inspect on-site haul routes for integrity and instigate any necessary repairs to the surface as soon as reasonably practicable.	Highly recommended
47. Record all inspections of haul routes and any subsequent action in a site log book.	Highly recommended
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers, and regularly cleaned.	Highly recommended
Waste management	

Mitigation measure	Overall recommendation Highly recommended / Desirable / Not required
31. Avoid bonfires and burning of waste materials.	Highly recommended

Table 5-6 Mitigation measures specific to demolition

Mitigation measure	Overall recommendation: Highly recommended / Desirable / Not required
32. Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Not applicable The demolition of buildings is not anticipated
33. Ensure effective water suppression is used during demolition operations. Hand-held spays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high-volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Not applicable
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Not applicable
35. Bag and remove any biological debris or damp down such material before demolition.	Not applicable

Table 5-7 Mitigation measures specific to earthworks

Mitigation measure	Overall recommendation: Highly recommended / Desirable / Not required
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Desirable
37. Use hessian fabric, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Desirable
38. Only remove the cover in small areas during work and not all at once.	Desirable

Table 5-8 Mitigation measures specific to construction

Mitigation measure	Overall recommendation: Highly recommended / Desirable / Not required
39. Avoid scabbling (roughening of concrete surfaces) if possible.	Not applicable
40. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Not applicable
41. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Not applicable
42. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.	Not applicable

Table 5-9 Mitigation measures specific to trackout

Mitigation measure	Overall recommendation: Highly recommended / Desirable / Not required
43. Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Desirable
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Desirable
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Desirable
50. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Not required
51. Access gates to be located at least 10m from receptors where possible.	Not required

5.2 Air quality monitoring

5.2.1 An appropriate monitoring survey, as recommended in table 5-5 which is commensurate with the level of risk and relatively low numbers of nearby receptors, would be undertaken to form a key part of the overall dust mitigation and management process. The approach and scope of the air quality monitoring survey would be informed by the IAQM guidance on monitoring near demolition and constructions sites [RD9] and would include dust deposition monitoring using passive dust deposition gauges. Supplementary monitoring of weather conditions including wind speed, wind direction and rainfall would be undertaken.

5.2.2 The approach and scope of the air quality monitoring survey would be informed by the IAQM guidance on monitoring near demolition and construction sites [RD9], which states that:

"Monitoring may be carried out in order to fulfil a number of objectives:

- to ensure that the construction activities do not give rise to any exceedances of the air quality objectives/limit values for PM_{10} and/or $PM_{2.5}$, or any exceedances of recognised threshold criteria for dust deposition/soiling;
- to ensure that the agreed mitigation measures to control dust emissions are being applied and are effective;
- to provide an "alert" system with regard to increased emissions of dust, and a trigger for cessation of site works or application of additional abatement controls;
- to provide a body of evidence to support the likely contribution of the site works in the event of complaints; and
- to help to attribute any high levels of dust to specific activities on-site in order that appropriate action may be taken."

5.2.3 Although the proposed monitoring system would not provide a real-time "alert" system, the results of the dust deposition monitoring (based on the monthly dust deposition sampling results) would be reviewed to identify if the agreed thresholds have been exceeded, and if investigation and additional mitigation is required to reduce dust emissions from site activities (or even if site activities need to be altered or temporarily suspended).

5.2.4 The scope of the monitoring discussed in this section and the basis for setting appropriate thresholds for identifying potentially unacceptable dust soiling at human receptors would be included as part of the air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

6 Step 4 Determine significant effects

6.1.1 The assessment has identified that there are potentially sensitive dust receptors located in close proximity to the compensation sites (see figures 4, 5 and 6), including residential properties and commercial premises. There are numerous high sensitivity receptors located within 350m of the respective compensation site boundaries (see table 3-4 to table 3-6). The receptor locations are reported from the respective site boundaries and not the actual location of activities with the potential to generate dust and the distances used in the assessment are therefore cautious, as activities with high potential to generate dust (including PM_{10} and $PM_{2.5}$) would often be offset from the respective boundaries. The sensitivity of the assessed areas at Cae Canol-dydd and Cors Gwawr, which takes into consideration the number and distance of receptors from the assessed compensation sites and baseline conditions, are summarised in table 4-5 as being Low sensitivity with respect to emissions of PM_{10} and $PM_{2.5}$ and Low to Medium sensitivity with respect to changes in dust deposition rates and associated effects on amenity.

6.1.2 Consideration of the meteorological conditions experienced within the respective study areas (section 2.4) has identified that there is the potential for dust generated on-site to be blown towards receptors on all sides of the respective compensation sites, receptors located to the north and northeast would be downwind more frequently. The scale of the proposed works has been used to judge the dust emission magnitude as being between Small and Medium magnitude for the activities associated with the creation of the assessed compensation sites.

6.1.3 Based on the matrix of relationships between sensitivity of the area and the dust emission magnitude, it is considered that the proposed earthworks and trackout activities at Cae Canol-dydd and Cors Gwawr are predicted to be a Low or Negligible risk (see table 4-7) as there is limited potential for emissions of PM_{10} and $PM_{2.5}$ to increase baseline concentrations to a value that is above the air quality objective values set for the protection for human health. For potential dust soiling effects, there is predicted to be a Low to Medium risk from earthworks activities and Negligible risk from trackout activities (see table 4-7). There is the potential for infrequent, short term episodes when baseline dust deposition rates could be increased by an amount that residents could perceive.

6.1.4 The adoption of good practice dust mitigation measures to manage the generation of emissions at source will therefore be required, as proposed in the air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

6.1.5 The respective compensation sites encompass large areas, but not unusual in scale in comparison with other major infrastructure projects. There are mitigation methods already available that have been successfully applied on other schemes to manage emissions of dust so that significant off-site effects have not occurred. Such measures are considered to be no more than normal good practice that would be adopted by any contractor meeting the requirements of the Wylfa Newydd CoCP (Application Reference Number:

8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7). It is considered that there are no potentially dust-generating activities proposed that could not be managed using normal good practices [RD1] so as to prevent significant effects at any off-site receptor.

6.1.6 This should be considered in conjunction with the analysis of local climatic conditions (see section 2.4) which shows that the likelihood of dust being emitted by wind erosion and being transported to off-site receptor locations is relatively low.

6.1.7 For the assessed ecological receptors in the vicinity of Cae Canol-dydd, there is predicted to be a Medium risk for predicted impacts from earthworks activities. For the assessed ecological receptors in the vicinity of Cors Gwawr, there is predicted to be a Medium risk for predicted impacts from earthwork activities with the exception of the nearby Tir Pori Talwrn Wildlife Site where a Low risk is predicted.

6.1.8 IAQM guidance [RD1] notes that with the application of good practice mitigation measures of the type available for use on this project, the environmental effect would not be significant at any off-site receptor. IAQM guidance [RD1] also notes that, even with a rigorous package of mitigation measures in place, such as those taken forward from this assessment and included as part of the air quality management strategy set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7), occasional impacts may occur. The Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7) provides a framework by which the level of mitigation is adapted to respond proactively to the changing risk of dust emissions, so that significant effects are prevented.

7 References

Table 7-4 Schedule of references

ID	Reference
RD1	Institute of Air Quality Management (IAQM). 2016. *Guidance on the Assessment of Dust from Demolition and Construction Version 1.1*. London: Institute of Air Quality Management.
RD2	The Scottish Office. 1998. Planning Advice Note PAN 50 Annex B, Controlling the Environmental Effects of Surface Mineral Workings, Annex B: The Control of Dust at Surface Mineral Workings. Edinburgh: The Scottish Office Development Department.
RD3	Arup. 1995. *The Environmental Effects of Dust from Surface Mineral Workings*. PECD 7/1/468. Report on behalf of the Department of the Environment. London: HMSO
RD4	Isle of Anglesey County Council (IACC). *2014 Air Quality Progress Report for Isle of Anglesey County Council*. Isle of Anglesey County Council, Llangefni.
RD5	The Isle of Anglesey County Council. 2017. Air quality monitoring data provided in an email from the IACC on 08 March 2017.
RD6	Vallack, H. W. Shillito, D. E. 1998. Suggested guidelines for deposited ambient dust. *Atmospheric Environment*, Vol. 32, No. 16, 08.1998, pp. 2737-2744.
RD7	Environment Agency. 2003. Assessment of noise disturbance upon birds and dust on vegetation and invertebrate species. Report Ref. 6502-E.075EA.
RD8	Cheffings, C.M. and Farrell, L. (Eds.), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. 2005. *The Vascular Plant Red Data List for Great Britain*. Species Status 7: 1-116. Peterborough: Joint Nature Conservation Committee.
RD9	Institute of Air Quality Management. 2012. *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*. London: Institute of Air Quality Management.

Annexe 2: Flood consequences assessment

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Annex 2: Flood consequences assessment

Contents

Appendices

Appendix 1 FCA Assessment methodology

1 Introduction

1.1 Overview

1.1.1 This Flood Consequence Assessment (FCA) describes the assessment of potential effects on flood risk resulting from the conversion of two sites to fen habitats in order to compensate for the potential loss or damage to the Tre'r Gof Site of Special Scientific Interest (SSSI) as a result of the Wylfa Newydd Project.

1.1.2 The FCA has assessed the flood risk posed to the sites that have been designated for SSSI compensation as well as any changes to flood risk arising from the Proposals.

1.2 Site location and study area

1.2.1 The site locations and details are provided in appendix D1-2, WNDA Development - Ecological Compensation Sites: Assessment of Environmental Effects (Application Reference Number: 6.4.18) with a brief summary included below.

1.2.2 The SSSI Compensation Sites are located around the village of Talwrn. The first site is located to the south of Talwrn and will join the Caeau Talwrn SSSI and the Cors Bodeilio SSSI, this site is hereafter referred to as Cors Gwawr. The second site comprises two separate sites joining and extending parts of the Caeau Talwrn SSSI. These sites are both located to the north-west of Talwrn. The first site connects two separate parts of the Caeau Talwrn SSSI and the second site extends the SSSI towards the B5110. These sites are collectively referred to as Cae Canol-dydd.

1.2.3 A third site known as Ty du is proposed to be managed through clearance of shrubs and other vegetation. This site is scoped out of this assessment as the proposed works will not have a measurable effect on flood risk to or from the site.

1.3 Technical Advice Note (TAN) 15 Development Advice Map

1.3.1 There are two initial reference maps for assessing the level of fluvial and tidal flood risk associated with land: the TAN 15 Development Advice Map [RD1] and the Natural Resources Wales (NRW) flood map of fluvial flood risk [RD2]. These are broadly similar, although the NRW flood map provides additional detail in relation to flood probability. The TAN 15 Development Advice Map, which shows the fluvial and coastal flood zones as issued by the Welsh Government, is primarily used in this assessment as the classifications from this directly relate to planning policy.

1.3.2 The TAN 15 flood zones are defined as follows:

- Zone A: Considered to be at little or no risk of fluvial or coastal/tidal flooding;

- Zone B: An area known to have been flooded in the past;
- Zone C1: An area with an annual probability of flooding from tidal and fluvial sources greater than 0.1%, but which has significant infrastructure including flood defences; and
- Zone C2: An area with an annual probability of flooding from tidal and fluvial sources greater than 0.1% and without significant flood defence infrastructure.

1.4 Planning guidance for an FCA

1.4.1 In Wales, *Planning Policy Wales* (PPW) [RD3] and *Technical Advice Note* (TAN) *15: Development and Flood Risk* [RD4] provide the national policy framework for the assessment and management of flood risk for new developments. Taken together, they establish a presumption against development in areas at the highest risk of flooding, setting a framework for the sequential assessment of the suitability of sites for development. They also set out an assessment methodology (the FCA methodology) for the systematic evaluation of flood risk and the need to integrate mitigation and flood resilience in the design of new development.

1.4.2 This FCA has been written to address the planning policy requirements for the conversion of the fen habitat, in association with TAN 15 guidance.

1.5 Report objectives

1.5.1 The objectives of this FCA are to:

- identify possible mechanisms by which the potential fen habitats could flood;
- identify any aspects of the design that could exacerbate flooding elsewhere;
- undertake a formal assessment of the risks posed to the potential fen habitats from all identified flood risk sources and mechanisms;
- confirm that the potential fen habitats would not exacerbate flooding elsewhere;
- consider the level and acceptability of any residual flood risk; and
- produce an FCA compliant with TAN 15 and PPW.

2 Policy and planning

2.1 Planning context

2.1.1 The context for planning policy in Wales is set out within PPW Edition 9 [RD3]. This provides the national policy framework for the assessment and management of flood risk for new developments and references a range of European and national legislation that relates to the flood risk. This is supplemented by TAN 15 [RD4] and local planning policy.

2.2 PPW

2.2.1 The objective of PPW is to avoid the construction of new development within areas defined as being at flood risk, with planning authorities adopting a precautionary approach when formulating development plan policies, including the principle that climate change will likely increase the risk of coastal and river flooding. A strategic approach to flood risk that considers the catchment as a whole is encouraged.

2.2.2 PPW states that new development should not be at risk of flooding itself and should not increase the risk of flooding elsewhere. Additionally, hard-engineered flood defences should be considered likely to be unsustainable in the long term, and new development should avoid development in flood hazard zones.

2.2.3 Only essential transport and utilities infrastructure is considered acceptable within unobstructed floodplains, and then only when such infrastructure is designed to remain operational during times of flooding and with no net loss of floodplain storage or increase in flooding elsewhere.

2.3 TAN 15

2.3.1 TAN 15 provides technical guidance that supplements the policy set out in PPW in relation to development and flooding. It advises on development and flood risk relating to sustainability principles and provides a framework within which risks arising from both river and coastal flooding, and from additional runoff from development in any location, can be assessed. This incorporates climate change scenarios.

2.3.2 TAN 15 provides guidance on flood consequences that may not be acceptable for particular types of development. The location of the development needs to be justified in line with TAN 15 and flood risk areas, and the consequence needs to be acceptable given the vulnerability and use of the receptor.

2.3.3 Development should be directed towards Flood Zones A and B and will only be acceptable in Flood Zones C1 and C2 if it is necessary as part of a local regeneration scheme or to sustain an existing settlement or if key to support employment objectives.

2.3.4 The guidance defines a threshold for the frequency of flooding below which development should not be allowed. This threshold for General Infrastructure is equivalent to the 1% Annual Exceedance Probability (AEP) event, or an

event with a 1 in 100 chance of occurring in any given year for fluvial flooding; and it is equivalent to the 0.5% AEP event, or an event with a 1 in 200 chance of occurring in any given year, for tidal flooding. Additionally, guidance is presented in TAN 15 on acceptable flood depths with respect to different development types. In most cases this is 600mm. These thresholds automatically apply to all developments in Flood Zone A and B and to those in Flood Zone C once the justification test has been passed and only in events greater than the threshold frequency.

2.3.5 It is also a requirement of TAN 15 that future users and occupiers of the site are adequately aware of the flood risk and consequences, that effective flood warning is provided, that emergency flood plans are available and that safe access and egress are available. There is also a requirement that the site is designed to facilitate movement of goods/possessions away from flooding, to minimise structural damage and to facilitate recovery.

2.3.6 TAN 15 also states that new development should not increase flooding elsewhere; however, it acknowledges that there may be practical difficulties in achieving this aim.

2.3.7 TAN 15 states that consideration must be given to the impacts climate change may have on the risk of flooding over the lifetime of a development; to ensure that development does not take place where flooding would be unacceptable either now or in the future. The Welsh Government has provided guidance (CL-03-16) [RD5] on how the UK climate change projections (UKCP09) [RD6] should be used to determine the future flood consequences for developments in Wales and must be incorporated in all FCAs produced after December 2016.

Local planning policy

2.3.8 The Anglesey and Gwynedd Joint Local Development Plan forms the basis for land use planning in the Anglesey and Gwynedd areas. The Written Statement was published in 2017 [RD7] and is the main source of local planning policy. Within the Plan, the strategic objectives in relation to flood risk are the following.

- "Minimise, adapt and mitigate the impacts of climate change. This will be achieved by: ensuring that highly vulnerable development is directed away from areas of flood risk wherever possible."
- "Ensure that settlements are sustainable." This will be achieved by, amongst other measures, ensuring that: "new developments that are vulnerable to harm will not be located in areas at risk from flooding".

2.3.9 In order to adapt to the effects of climate change Policy PS 6 (Alleviating and adapting to the effects of climate change) requires proposals to take account and respond to a number of concerns, including: "*Locating* [developments] *away from flood risk areas, and aim to reduce the overall risk of flooding within the Plan area and areas outside it, taking account of a 100 years and 75 years of flood risk in terms of the lifetime of residential and non-residential development, respectively, unless it can be clearly demonstrated that there is no risk or that the risk can be managed"* and to: "*Aim for the highest possible*

standard in terms of water efficiency and implement other measures to withstand drought, maintain the flow of water and maintain or improve the quality of water, including using sustainable drainage systems".

2.3.10 The Anglesey and Gwynedd Joint Local Development Plan Stage 1 Strategic Flood Consequence Assessment [RD8] forms a key part of the evidence base for planning with respect to review of FCAs. The document helps to determine appropriate development policies and land allocations that avoid or minimise flood risk from all sources, and helps to assess any future development proposals in line with the precautionary framework in PPW and TAN 15. This document and the Isle of Anglesey County Council's *Preliminary Flood Risk Assessment* [RD9] include information on surface water, groundwater, ordinary watercourses and small reservoir flooding. Information on the Isle of Anglesey County Council flood strategy and the Council's objectives in managing flood risk are provided in the *Anglesey Local Flood Risk Management Strategy* [RD10].

River Basin Management Plan

2.3.11 The proposed SSSI Compensation sites are wholly located within the Western Wales River Basin. The Western Wales River Basin Management Plan for 2015 – 2021 [RD11] provides an overview of NRW's approach to managing flood risk within the Western Wales River Basin. It details measures designed to reduce the potential for flooding, such as use of sustainable drainage systems and improvements and maintenance of flood defence schemes. In addition, the plan proposes improving the understanding of flood risk through the application of mapping and modelling.

3 Baseline site context

3.1 Climate

3.1.1 The UK Meteorological Office rainfall data available online for the period 1981 to 2010 show an average annual rainfall at Valley (13km to the west of the proposed fen habitats) of 841mm/year, which is below the UK average of 1,154mm/year.

3.1.2 Long-term data indicate rainfall is typically higher in the late autumn/early winter and lowest in late spring/early summer.

3.2 Landscape

3.2.1 Both sites are used primarily for pasture and cover for game. The majority of Cors Gwawr is covered by rich fen species with areas of poor quality fen located towards the north-east. The northern and central section of Cae Canol-dydd is also dominated by rich fen with patches of poor quality fen also located in the centre within the Corsydd Mon SAC.

3.3 Topography

3.3.1 Cors Gwawr is formed in a basin that lies at the head of a shallow valley, enclosed by higher ground to the north, east, south and south-west, with the valley sloping gently downwards towards the north-east. The elevation of the site ranges from approximately 41mAOD in the south-west to 29mAOD in the north-east.

3.3.2 Cae Canol-dydd also lies within a basin at the head of a valley, surrounded by hills to the north, east and west. Elevation of the site ranges from 60mAOD in the north-east to 38mAOD in the south.

3.4 Off-site receptors

3.4.1 Off-site flood risk receptors are located just outside the Order Limits of Cors Gwawr and Cae Canol-dydd. Part of Corsydd Mon SAC is a receptor which borders the southern extent of Cors Gwawr and a second part of the SAC forms the central section of Cae Canol-dydd.

3.4.2 In addition to the ecologically designated sites, there are a number of other off-site receptors. There are roads adjacent to the sites, including the B5110 to the immediate northwest of Cae Canol-dydd, and minor roads to the southeast and southwest of Cors Gwawr. There are also a number of farms / residential properties adjacent to both sites, including:

- Bryngors, Iscoed, Bron Haul, Cae-penrhyn, Pen-yr-allt, Craig-Las, Tyddyn Waen and several other properties which are all adjacent to Cors Gwawr; and
- Canol-dydd, Merddyn-hafod, Llwyn ysgaw, Neuadd Wen and several other properties which are all adjacent to Cae Canol-dydd.

3.5 Surface water features

3.5.1 There is a main river within Cors Gwawr that flows to the north-east through the site following the lay of the land, confined on both the north-west and south-east side by steeper sloping valley sides. This watercourse is fed by a network of artificial drainage channels which also flow north-east before joining with the main river. The main river subsequently joins the Afon Nodwydd further downstream which then drains into Traeth-coch.

3.5.2 Within Cae Canol-dydd there are three ordinary watercourses, two of which flow south-west and one which flows north. All of these watercourses join a main river, referred to as the Afon Canol-dydd, flowing south-west and ultimately towards Llangefni.

3.6 Geology and hydrogeology

3.6.1 The bedrock beneath the majority of Cae Canol-dydd comprises Lligwy Sandstone Formation with the bedrock to the east comprising Clwyd Limestone Group. That to the south comprises sandstone and conglomerate interbedded.

3.6.2 A layer of glacial till covers the bedrock across the majority of Cae Canol-dydd, with the exception of the far east of the site where there is no drift cover. Alluvium overlays the till in the west, along the route of the ordinary watercourse. Where the till has a clay matrix it will have a low permeability and limited significance for groundwater supply or river base flow. Given that Cae Canol-dydd was likely to have previously been fen and that it has subsequently been drained by installing drainage ditches, this suggests that the soil and till underlying the site is clayey in nature and of relatively low permeability.

3.6.3 The bedrock underlying the majority of Cors Gwawr comprises the Clwyd Limestone Group with interbedded sandstone with the east of the site being underlain by schist, quartzite and pillow lavas.

3.6.4 Alluvium is understood to overlay the till in the north. The thickness of the till is unknown. Peat is present across the site, forming a 0.2m topsoil layer at boring locations across the site.

3.7 Water services

3.7.1 There are no known water services present at either of the sites, however, sub-surface drainage (land drains) has been implemented across Cae Canol-dydd in order to aid drainage allowing the land to be used for grazing/game cover.

3.8 Reservoirs

3.8.1 The closest reservoir is Cefni reservoir, which is approximately 2.5km west of Cae Canol-dydd and 3.5km west of Cors Gwawr.

4 Cae Canol-dydd and Cors Gwawr proposals

4.1 Concept

4.1.1 The Cae Canol-dydd and Cors Gwawr proposals are intended to compensate for the loss of area from Sites of Special Scientific Interest (SSSI) as a result of the Wylfa Newydd Project. The compensation will increase the wetness of the sites and the provision of compensation is intended to be permanent.

4.1.2 The eventual long-term management of the site will involve low intensity grazing. Cae Canol-dydd physically connects existing areas of designated and undesignated rich-fen habitat, and grazing management will therefore seek to manage this entire rich-fen unit as a single entity where possible. This will allow for the better management of existing fen, especially small, fragmented areas.

4.1.3 Adaptive management would be undertaken at the sites, with hydrological monitoring used to determine the effectiveness of the measures implemented relative to the objectives for SSSI compensation. The degree to which objectives were being met and the rate of change would be used to identify whether additional interventions were needed to enhance specific aspects of the site. Additional measures would consist of similar interventions intended to increase the storage of water within the site to improve wetness or to improve the landform to further encourage the creation of target habitats. Hydrological monitoring would also be used as a route for impacts on flood risk to be monitored through construction and into the initial stages of the site's longer-term management.

4.2 Site layout

4.2.1 Based on the existing conceptual understanding of each site, a number of potential options for raising water levels, and creating or enhancing areas of alkaline fen, have been identified, which include:

- dam (low key dams such as plank weirs) installation across surface water drainage channels to retain water;
- removal, or diversion, of local surface water drainage channels;
- removal of buried field drains or blocking their outflows;
- localised changes to the topography to retain water; and
- diversions of calcareous spring flows across the site.

4.2.2 Hydrological monitoring will be undertaken to collect data on the effect of the measures implemented. These data will be used to identify the effectiveness of the measures and to determine whether additional measures are required to improve the effectiveness of the compensation and what those measures may entail. This will provide a route for impacts on flood risk to be monitored through construction and into the initial stages of the site's longer-term management.

5 Flood modelling

5.1 Sources of modelling data

5.1.1 The sources of flood modelling data and flood mapping described below have been considered within the preparation of this FCA.

- **NRW long term flood risk mapping [RD2]:** This mapping, delivered as part of a national programme, delineates indicative areas of elevated flood risk into four flood zones and includes major fluvial (catchment area >3km^2), tidal sources and surface water runoff.
- **TAN 15 Development Advice Map, [RD1]:** This mapping, which is primarily based on the NRW flood map, defines indicative areas where the annual probability of inundation from fluvial and tidal sources is greater than 0.1% (Zone C). It also identifies areas where there are geological indicators of elevated flood risk (Zone B) with low-risk areas classified as Flood Zone A.

5.1.2 While the NRW flood map [RD2] does provide some additional detail in relation to flood probabilities over and above the TAN 15 Development Advice Map, the two are broadly comparable. The TAN 15 Development Advice Map which shows the fluvial and coastal flood zones, as issued by the Welsh Government, is mainly discussed here as the classifications from this better relate to planning policy.

5.1.3 The TAN 15 Development Advice Map categorises locations from A to C based on their perceived flood risk as detailed in section 1.3. The maps are based on the best currently available data. They use the Environment Agency's extreme flood outlines to inform Zone C and the British Geological Survey's drift data to inform Zone B.

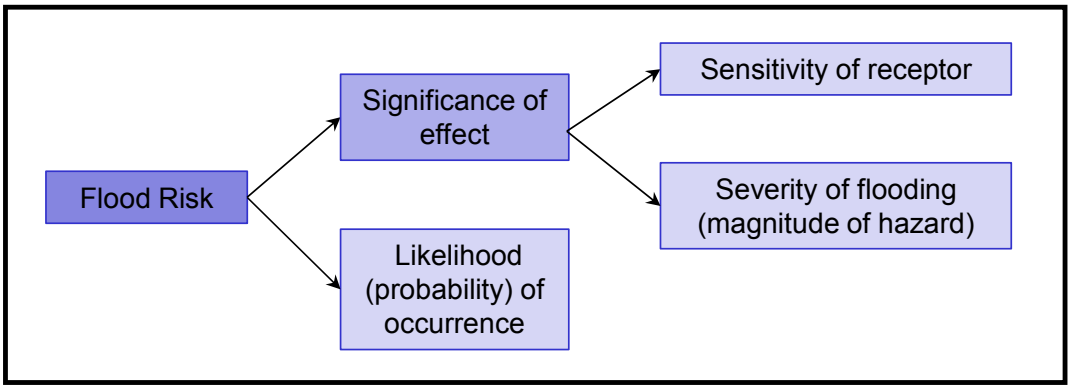
5.1.4 A detailed explanation of the risk shown in the TAN 15 and NRW flood map is given in section 6.2.

6 Flood risk assessment

6.1 FCA methodology

6.1.1 The risk assessment methodology used within this FCA is set out in appendix 2 and is based on PPW [RD3] and associated guidance [RD4]. The guidance recommends that flood risk be assessed through consideration of both the magnitude of potential impacts and the probability of occurrence. The magnitude of impact is then dependent on two factors: the sensitivity of potential receptors and the severity of the flooding. Thus, the three criteria on which flood risk is assessed are:

- sensitivity of the receptor;
- severity of flooding; and
- probability of occurrence.



Sensitivity of receptors

6.1.2 The sensitivity of receptors is defined according to the method outlined in appendix 2 with a range of sensitivities from very high through high, medium and low, to very low. TAN15 guidance outlines the vulnerability of different types of on-site development and also classes all off-site receptors as highly sensitive to flooding. The sensitivity of the receptors at and around the proposed SSSI Compensation Sites are defined in section 6.3.

Severity of flooding

6.1.3 Appendix 1 of TAN 15 identifies acceptable thresholds of flooding for different types of development and also presents indicative consequences of flooding that may be acceptable subject to adequate warnings and preparation. This guidance has been used to define consequences of flooding that fall within the categories negligible, low, medium, high and very high hazard. Further information on the typical criteria against which the category is defined is presented in appendix 2.

Likelihood of occurrence

6.1.4 The likelihood of occurrence is used to give an understanding of how regularly a given event or outcome will occur. This is fully defined within

appendix 2, and the classification of these criteria is discussed for the different flood sources in the sections below.

Consideration of seasonality

6.1.5 Flooding can occur at any time of year, although it can exhibit quite different seasonal characteristics. Summer flooding is generally associated with localised, high intensity, convective rainfall events, resulting in rapid runoff response in which the peak flow is the main driver of flood risk. This can be a particular issue in urban catchments where significant areas of impermeable surfaces result in rapid runoff. Winter events are generally associated with slower moving frontal systems, they are often prolonged and less intensive and they occur on typically wetter catchments, resulting in longer hydrographs with lower peaks but substantially more volume.

6.1.6 The catchments of concern in this study are rural, they are generally small in size and have shallow low permeability soils meaning that they are likely to be more susceptible to high intensity summer storms than to winter frontal events. Presentation of the results for a summer event only is therefore included in this FCA.

6.2 FCA screening

6.2.1 Industry guidance [RD12] recommends that an FCA should consider all possible sources of flooding for a given site. This is also reflected in the TAN 15 guidance on flood risk. Table 6-4 summarises a range of potential risks and whether these are relevant to the proposed Cae Canol-dydd and Cors Gwawr sites.

Table 6-4 Screening of potential flood sources

Flood type	Source	Pathway	Receptor	Consider further?
Tidal	Irish Sea	Cae Canol-dydd and Cors Gwawr are situated away from the Irish Sea and are not within a tidal flood zone so there is no pathway.	Cae Canol-dydd and Cors Gwawr, Corsydd Mon	No
Fluvial and pluvial	Fluvial flooding	Flooding from watercourses through Cae Canol-dydd and Cors Gwawr	Cae Canol-dydd, Cors Gwawr, Corsydd Mon and off-site receptors	Yes
	Pluvial flooding	Surface water flooding due to intense rainfall across Cae Canol-dydd and Cors Gwawr	Cae Canol-dydd, Cors Gwawr, Corsydd Mon and off-site receptors	Yes
Groundwater	Groundwater	Water movement through the aquifer	Cae Canol-dydd and Cors Gwawr	Yes
Services	Sewerage network	No known network passes through the site	Cae Canol-dydd and Cors Gwawr	No
	Water mains	No known water mains pass through the site	Cae Canol-dydd and Cors Gwawr	No
	Site drainage system	No hard engineered drainage systems in place	Off-site areas	No

Flood type	Source	Pathway	Receptor	Consider further?
Reservoir flooding	Failure of reservoir	The sites are not within a reservoir flood risk zone so there is no pathway.	Cae Canol-dydd and Cors Gwawr	No

6.3 Sensitivity of receptor

6.3.1 Following the methodology presented in appendix 2, all off-site buildings and infrastructure (including roads) are considered to be highly sensitive to flooding, whilst undeveloped/agricultural land has a medium sensitivity. The nature of the SSSI Compensation Sites mean that the land within the Order Limit boundary is considered to be water-compatible with a low sensitivity. The ecologically designated sites are considered to have a high sensitivity.

6.4 Fluvial and pluvial flooding

6.4.1 Fluvial and pluvial flood risk has been assessed using the flood mapping available on the NRW website.

Fluvial flood risk

6.4.2 Cae Canol-dydd contains areas that are designated as Flood Zone B [RD1]. According to TAN15 [RD4], this means that there the areas are known to have flooded in the past, though it is understood that this is largely if not solely driven by the presence of geological indicators of fluvial conditions, such as alluvium. Elsewhere the site falls within Flood Zone A. This means that there is considered to be little to no risk of fluvial flooding to the site. It should be noted that the Afon Canol-dydd, despite being a main river, is a small catchment that will not have been included in the modelling used to produce TAN 15's Development Advice Maps [RD1].

6.4.3 At Cae Canol-dydd the flood risk is likely to be concentrated around the watercourses themselves. There are no major structures, therefore the risk present is likely to be linked to channel capacity and associated with the overtopping of the watercourse when this is exceeded.

6.4.4 According to the Development Advice Maps [RD1], Caeau Talwrn and Cors Bodeilio SSSI (also a component of the Corsydd Mon SAC) and the proposed Cor Gwawr compensation area are all located within or contain Flood Zone B. As at Cae Canol-dydd, the NRW flood maps [RD2] do not show a fluvial flood risk though this is likely to be down to catchment size being less than 3km^2. Again, there are no major structures, therefore the risk present is likely to be linked to channel capacity and associated with the overtopping of the watercourses when this is exceeded.

6.4.5 The proposed options set out in Section 4.2 will inevitably result in local changes to the flow of water within the sites. Dam installation will increase water levels and likely produce standing water in locations where these are placed. The removal of drainage channels and buried field drains will also

encourage the flow of water at the surface and result in additional ponding. Localised changes to topography will also influence these effects. The effect of the SSSI compensation sites will therefore alter the probability of flooding within the site and its locale. However, this is the intention of the SSSI Compensation Sites concept and is not therefore considered a negative effect, despite such an effect being counter to the principles of TAN 15 which seeks to avoid any increases in flood risk, including increases in flood level, regardless of land use or location. This notwithstanding, TAN15 was not prepared to address developments such as providing wetland enhancement.

6.4.6 At Cae Canol-dydd the changes described will take place within the Order Limits of the SSSI Compensation sites and will not be applied within the existing ordinary watercourses or main rivers. Localised changes in flood risk are therefore expected within the sites but not within the surrounding watercourses and so no changes are expected elsewhere. The changes anticipated within the site are expected to have no greater than a low magnitude of the hazard, as any changes in water levels within the site are likely to be relatively shallow. Given the low sensitivity of the land the significance of the potential effect is classed as very low, but because of the high likelihood of occurrence, the impact on overall flood risk is classed as low.

6.4.7 As at Cae Canol-dydd, the proposed changes at Cors Gwawr will take place within the Order Limits of the SSSI Compensation Sites and will not be applied within the existing ordinary watercourses or main rivers. Localised changes in flood risk are expected within the sites, however, in this case there may be some changes also observed within the existing areas of pluvial flood risk because of the nature of the floodplain in this area, which is wide and which spans a number of the smaller watercourses and the main river. Nonetheless, no changes in areas outside of the Order Limits are expected. Changes within Cae Canol-dydd are assessed as having a low magnitude of hazard in terms of flood levels, as they are likely to be relatively minor in scale. The low sensitivity will result in a very low significance of effect, which combined with a high likelihood will result in an overall low impact on flood risk.

Pluvial flood risk

6.4.8 The risk of pluvial flooding is considered to be largely the same as fluvial flooding, as for both sources the risk is driven by the same mechanisms.

6.4.9 Within Cae Canol-dydd the pluvial flood risk is shown to be related to the watercourses and the areas immediately adjacent. Areas of low to high flood risk are indicated; high is associated with the channels and low associated with areas set further back from the channels. In isolated areas there are small areas of higher risk, which are likely to be local topographical features.

6.4.10 NRW maps of surface water flood risk [RD2] identify areas of low to high flood risk at the north-eastern section of Cors Gwawr. The areas highlighted at risk of flooding will be a combination of areas with a low elevation in which ponding occurs and some areas at which there is a convergence of multiple surface water drainage ditches. All areas currently at risk are undeveloped and there are no off-site receptors.

6.4.11 As described for fluvial flood risk, the overall impact on flood risk at both sites is considered to be low.

Flood risk off-site

6.4.12 As described above, the proposed changes to create the SSSI Compensation Sites are intended to take place within the Order Limits of each site and are not expected to impact flood risk elsewhere.

6.4.13 There may be temporary changes in surface water runoff within the sites during construction. For example, heavy vehicles may compact permeable ground, thereby decreasing permeability and increasing surface water runoff. Site traffic may also mobilise sediment, increasing sediment load and sedimentation along the flow paths.

6.4.14 In order to ensure that there are no increases in flow from the site during construction that could impact adjacent receptors, the following activities, as detailed in the CoCP (Application Reference Number: 8.6), would be implemented:

- Where practicable, sustainable methods will be utilised for discharges including site drainage and surface runoff.
- Horizon will ensure sufficient drainage is installed prior to topsoil strip.
- All temporary hardstanding, as far as is reasonably practicable, will incorporate permeable surfacing unless there is a risk of surface water or groundwater pollution from contaminants.
- Wherever practicable, permeable surfacing will be used for minor tracks, haul roads and compounds.

6.4.15 The impact of the development on surface water flooding elsewhere would therefore be very low.

6.4.16 The proposed activities will permanently alter flow paths within the sites and increase retention of runoff at surface and within the soil. During the 'wetting up' stage following initial construction there may be less runoff leaving the sites, however, once the sites have 'wetted up', the overall runoff response (particularly in relation to peak flow rates) is expected to mirror those of the existing sites. Given the additional attenuation that will be available, it is possible that there will be a small reduction in the total volume of runoff. Overall, there will be no increased runoff rates that could impact adjacent sites or which would increase flood risk elsewhere.

6.4.17 In light of the above, the magnitude of the hazard is considered to be low, and with a high sensitivity to flooding, the significance of effect is low. The likelihood of occurrence is low and the overall impact on flood risk is considered low for all off-site receptors, including properties, roads, adjacent agricultural land and adjacent ecologically designated sites.

6.5 Groundwater

Groundwater emergence at surface

6.5.2 The presence of superficial deposits over much of the bedrock at Cors Gwawr and Cae Canol-dydd suggests that there would not be substantial groundwater emergence at the surface. However, the thickness and permeability of the superficial deposits is unknown, therefore there is a degree of uncertainty regarding the understanding of the groundwater flood risk and it is possible that groundwater could contribute to local surface water flooding within the sites and elsewhere and such a mechanism will be beneficial in the wetting of the sites.

6.5.3 Over the lifetime of the SSSI compensation sites, the magnitude of hazard associated with flooding from this source to Cae Canol-dydd, Cors Gwawr, Caeau Talwrn and Cors Bodeilio is considered to be very low. The sensitivity of these sites is low to medium and the significance of effect is therefore very low. Given a low to medium likelihood of occurrence the overall risk from and impact on groundwater flooding is considered low.

6.6 Flood risks

6.6.1 The risk of each type of flooding has been assessed in line with the methodology and guidance set out in appendix 2. This is then combined with the assessment of receptor vulnerability and assessment of the severity of the hazard of flooding for the receptor, which define the consequence of flooding on a scale ranging from negligible to high. The overall risk is based on a combination of the likelihood and the consequence. The risk assessment is included in table 6-5.

Table 6-5 Flood risk

Flood type	Source	Pathway	Receptor	Sensitivity	Magnitude of potential hazard	Significance of potential effect	Likelihood of occurrence	Flood risk	Flood risk after development
Fluvial and pluvial	Fluvial	Risk of flooding from watercourses	Cae Canol-dydd	Low	Low	Very Low	High	Low	Low
			Cors Gwawr	Low	Low	Very Low	High	Low	Low
	Pluvial	Breach of channel	Cae Canol-dydd	Low	Low	Very Low	High	Low	Low
		Breach of channel/ ponding	Cors Gwawr	Low	Low	Very Low	High	Low	Low
			Corsydd Mon, Caeau Talwrn, Cors Bodeilio	Medium	Negligible	Negligible	High	Negligible	Negligible
	Site development	Increased runoff from site	All off-site receptors	High to Medium	Low	Moderate	Low	Low	Low

Flood type	Source	Pathway	Receptor	Sensitivity	Magnitude of potential hazard	Significance of potential effect	Likelihood of occurrence	Flood risk	Flood risk after development
Groundwater	Groundwater	Risk of flooding due to groundwater emergence at surface	Cae Canol-dydd	Low	Very Low	Very Low	Medium	Low	Low
			Cors Gwawr	Low	Very Low	Very Low	Medium	Low	Low
			Corsydd Mon, Caeau Talwrn, Cors Bodeilio	Medium	Very Low	Very Low	Medium	Low	Low

7 Conclusions

7.1.1 Based upon the information available, the impact on the risk of flooding to both the SSSI Compensation Sites and to off-site receptors is considered to be low to negligible.

7.1.2 A pluvial flood risk has been identified within Cors Gwawr in a small area in the north of the site due to overtopping of the watercourse where multiple drains feed into the primary watercourse. In Cae Canol-dydd, pluvial flood risk is constrained to the main river channels.

7.1.3 The proposed SSSI Compensation Sites scheme is designed to increase water retention within the sites. The outcome will be increased standing water within the sites which may contribute to a very small reduction in the volume of runoff leaving the sites. There is not expected to be any change in overall peak runoff rates leaving the sites, either during construction or in the long term, therefore, no change in flood risk elsewhere is expected as a result.

7.1.4 The risk of flooding from groundwater is considered low. Groundwater is likely to be present and it may contribute to local surface water flooding. The SSSI Compensation Sites scheme is not expected to impact on this source of flooding.

7.1.5 The Wylfa Newydd Code of Construction Practice (Application Reference Number: 8.6) will ensure that site activities do not impact on flood risk elsewhere.

7.1.6 Adaptive management would be undertaken at the sites, with hydrological monitoring used to determine the effectiveness of the measures implemented and to identify whether any additional measures are needed.

8 References

Table 8-4 Schedule of references

ID	Reference
RD1	Welsh Government. 2017. TAN 15 Development Advice Map. [Accessed January 2018]. Available from https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default
RD2	Natural Resources Wales (NRW). 2016. Flood Risk Map. [Online] [Accessed: January 2018] Available from: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en
RD3	Welsh Government. 2016. Planning Policy Wales (PPW). Edition 9 [Online] [Accessed: January 2018] Available from: http://gov.wales/topics/planning/policy/ppw/?lang=en
RD4	Welsh Government. 2004. Technical Advice Note (TAN) 15: Development and Flood Risk. [Online] [Accessed: January 2018]. Available from: http://wales.gov.uk/docs/desh/publications/040701tan15en.pdf.
RD5	Welsh Government. 2016. *CL-03-16 Climate Change Allowances for Planning*. [Online] [Accessed April 2017] Available from http://gov.wales/topics/planning/policy/policyclarificationletters/2016/cl-03-16-climate-change-allowances-for-planning-purposes/?lang=en
RD6	Defra. 2009. *UK Climate Projections*. [Online] [Accessed April 2007] Available from http://ukclimateprojections.metoffice.gov.uk/22530
RD7	Isle of Anglesey County Council and Gwynedd Council. 2017. Anglesey and Gwynedd Joint Local Development Plan 2011-2026, Written Statement. [Online] [Accessed: September 2017]. Available from: http://www.anglesey.gov.uk/planning-and-waste/planning-policy/joint-local-development-plan-anglesey-and-gwynedd/
RD8	Isle of Anglesey County Council and Gwynedd Council. 2013. *Anglesey and Gwynedd Joint Local Development Plan, Topic Paper 8: Strategic Flood Consequence Assessment (Level 1)*. [Online] [Accessed: October 2016] Available from: http://www.anglesey.gov.uk/download/31094
RD9	Isle of Anglesey County Council. *Flood Risk Regulations 2009: Preliminary Flood Risk Assessment Report*. [Online]. [Accessed: April 2017] Available from: http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/flho1111bvfk-e-e.pdf
RD10	Isle of Anglesey County Council. 2013. Anglesey Local Flood Risk Management Strategy. [Online]. [Accessed: April 2017]. Available from: http://www.anglesey.gov.uk/download/32358

ID	Reference
RD11	Natural Resources Wales. 2015. Western Wales River Basin Management Plan 2015-2021. [Online] [Accessed: April 2017] Summary available from: https://naturalresources.wales/media/676165/wwrbdsummary.pdf.
RD12	Lancaster, J.W., Preene, M. and Marshall, C.T. 2004. *Development and flood risk - guidance for the construction industry*. Report C624. Construction Industry Research and Information Association

Appendix 1 FCA Assessment methodology

8-0.1.1 The following assessment methodology has been developed.

Assessment methodology

8-0.1.2 In line with the risk-based approach detailed by the Welsh Government and recommended elsewhere in industry guidance, the key to the classification is that the designation of significance (or risk) is based upon the consideration of:

- the sensitivity of the receptor – takes into account the nature of the proposals or receptor and its likely response to increased risk;
- the severity of the potential hazard – takes into account the potential nature of the flooding; and
- the likelihood of occurrence (i.e. likelihood) – takes into account both the presence of the hazard and receptor, and the integrity of the pathway.

Classification of sensitivity of the receptor

8-0.1.3 When considering new developments, the classification of sensitivity is based (where possible) directly on the technical guidance set out within TAN 15. When considering off-site impacts, there is a general assumption that all developments are highly sensitive. This assumption can, however, typically be relaxed when considering a water-compatible development or undeveloped land. Given this, the sensitivity of the receptor is ranked as shown in table 8-5.

Table 8-5 Classification of sensitivity of receptor

Sensitivity of receptor	New development	Off-site
Very High	Emergency services* developments	All built developments unless mitigating circumstances exist Key access routes
High	Highly vulnerable* developments	Other access routes
Medium	Less-vulnerable* developments	Undeveloped land
Low	Water-compatible[1] developments	-
Very Low	Flood attenuation features	-

[1] Category not outlined within TAN 15, but would include development that often need to be in a floodplain, such as buildings associated with water-sports or pumping stations for low-lying areas.

* For definitions of terms, please see figure 2 (in appendix B) of TAN 15

Classification of the magnitude of potential hazard

8-0.1.4 To classify the severity of the potential effects, it is necessary to look at the nature and scale of the individual impacts. These include, but are not confined to, the extent, depth and duration of flooding, and the velocity of flood waters. For new developments, the assessment is based on the likely post-development situation; for off-site receptors, it is based solely on the likely deterioration.

8-0.1.5 Given this, the severity of the potential hazard is then ranked as shown below in table 8-6 .

Table 8-6 Classification of magnitude of potential hazard

Magnitude of hazard	New development	Off-site
High	Any one of the following criteria achieved: • flood depths greater than 1m; • flood flow velocities greater than 0.45m/s; or • likely flood duration in excess of 24 hours.	Any marked (>10%) increase in flood depth, flood flow velocity or flood duration Any change in flood extent that impacts additional properties, including access to those properties
Medium	Any one of the following criteria achieved: • flood depths between 0.3m and 1m; • flood flow velocity greater than 0.15m/s; • likely flood duration in excess of one hour; or • any restrictions to access and egress.	Any other measurable increase of flood depths, durations, flow velocities or extent
Low	All of the following criteria achieved: • flood depths below 0.3m; • likely flood duration below one hour; and • flood-proofing measures planned.	Likely, but unquantifiable small increases of flood depths, durations, flow velocities or extent
Very Low	Planned or permitted flooding that does not adversely impact the built development	-
Negligible	No potential for flooding, or no identifiable impact of flooding	No likely increase in flood severity at any off-site location

Significance of potential impact

8-0.1.6 The magnitude of the hazard and the sensitivity of the receptor are combined using a matrix (shown below in table 8-7) to determine the significance of the potential effect, if realised.

Table 8-7 Matrix for determining the magnitude of the potential effect

		SENSITIVITY OF RECEPTOR				
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
SIGNIFICANCE OF POTENTIAL HAZARD	HIGH	Low	Moderate	Moderate	High	High
	MEDIUM	Very Low	Low	Moderate	Moderate	High
	LOW	Very Low	Very Low	Low	Moderate	Moderate
	VERY LOW	Negligible	Very Low	Very Low	Low	Low
	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible	Negligible

Classification of likelihood of occurrence

8-0.1.7 To classify the likelihood or probability of occurrence for a potential effect, it is necessary to understand how regularly a given event or outcome will occur. This can be assessed in a number of ways, including assessments based on historical data, quantitative analysis or experience from other similar sites. Often, this assessment will be based on standard guidance. The classifications used for defining the likelihood of a potential effect occurring are as shown below in table 8-8.

Table 8-8 Classification of likelihood of occurrence

Likelihood of occurrence	Potential effect
High	Any consequence would likely appear in the medium term and inevitably in the long term (i.e. the lifetime of the proposed development).
	Equivalent to an annual probability of flooding of greater than 1% (0.5% for tidal).
Medium	Circumstances are such that an event is possible in the medium term and likely over the long term, although not necessarily inevitable.
	Equivalent to an annual probability between 0.1% and 1% (0.1% and 0.5% for tidal).
Low	It is unlikely that any consequence would arise within the lifetime of the proposed development.
	Equivalent to an annual probability of less than 0.1%.
Very Low	It is unlikely that any consequence will ever arise.

8-0.1.8 It should be noted that in circumstances where sites are defended, determining an accurate assessment of probability of flood occurrence is complex, and assumptions that defences will not fail are unlikely to be acceptable. In such cases, assessments cannot be prescriptive and site-specific assessments would be undertaken. Factors that would be considered include construction, age, condition, maintenance, exposure and other external pressures.

Risk assessment

8-0.1.9 Once the significance of the potential effect and likelihood of occurrence have been assessed, these are then combined using a risk matrix (table 8-9) to assess the flood risk of each potential effect.

Table 8-9 Risk matrix

		LIKELIHOOD OF OCCURRENCE			
		VERY LOW	LOW	MEDIUM	HIGH
SIGNIFICANCE OF POTENTIAL EFFECT	HIGH	Low	Moderate	High	High
	MODERATE	Low	Low	Moderate	High
	LOW	Very Low	Low	Low	Moderate
	VERY LOW	Negligible	Very Low	Low	Low
	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible

8-0.1.10 Typically, flood risks assessed as low or less are considered acceptable. If the assessment results in moderate or high risk, this is considered significant (i.e. equivalent to a significant effect under the Environmental Impact Assessment regulations as set out in section 8.4 of chapter B8 (Application Reference Number: 6.2.8)), and additional mitigation measures would be required to facilitate development.

8-0.1.11 In some situations, the risk assessment procedure will result in an artificially low assessment of risk. This is particularly the case in situations where consequences of very rare flooding (i.e. breach scenarios) are so extreme that any residual risk, however low, would not be allowed. In such instances, the assessed risk would be elevated. Such decisions must always be accompanied by detailed justification.