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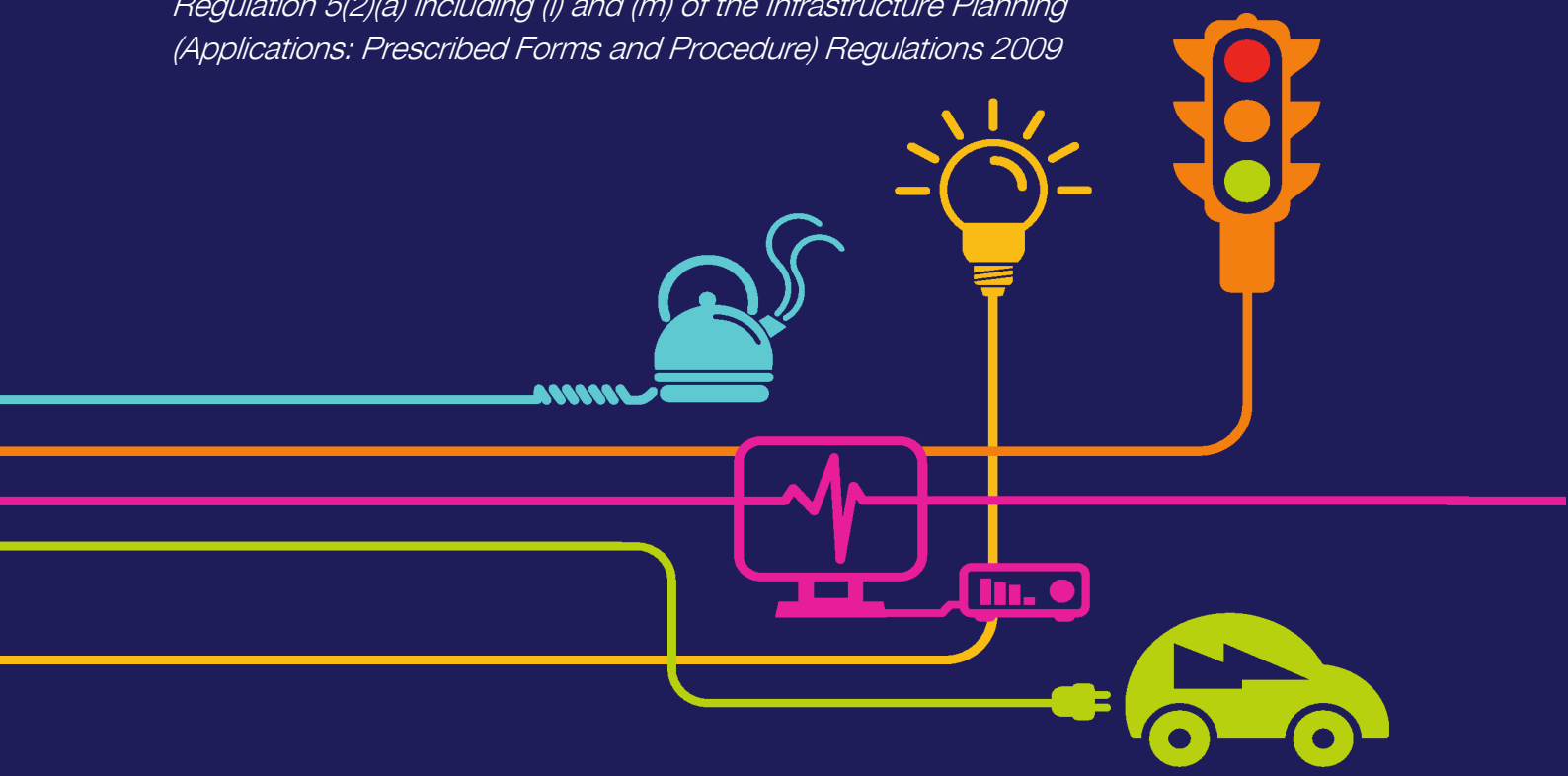
DOCUMENT 5.12.2.4

Overhead Line Flood Consequences Assessment

Chapter 12 – Appendix 4

National Grid (North Wales Connection Project)

Regulation 5(2)(a) including (l) and (m) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



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North Wales Connection Project

Volume 5

Document 5.12.2.4 Appendix 12.4 – Overhead Line Flood Consequences Assessment

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1 Introduction

1.1 CONTEXT

1.1.1 This Flood Consequences Assessment (FCA) accompanies an application by National Grid Electricity Transmission (plc) (National Grid) to seek powers to construct, operate and maintain a new 400,000 volt (400 kV) connection between Wylfa Substation and Pentir Substation, together with various associated development and other works ("The Proposed Development"). This document is the fourth of four FCA volumes that together comprise an appendix to Chapter 12 of the Environmental Statement: 'Water Quality, Resources and Flood Risk' (**Document 5.12**). The four FCA volumes are:

1.1.2 **Volume 1** Overarching FCA (**Document 5.12.2.1**)

1.1.3 **Volume 2** Pentir Substation Extension FCA (**Document 5.12.2.2**)

1.1.4 **Volume 3** Cable Sealing End Compounds and Tunnel Head Houses FCA (**Document 5.12.2.3**)

1.1.5 **Volume 4** Overhead Lines FCA (**Document 5.12.2.4**)

1.1.6 A list of references covering all volumes is included at the end of FCA Volume 1.

1.2 FCA SCOPE

1.2.1 FCA Volume 4 (**Document 5.12.2.4**) comprises an FCA of the overhead line (OHL) and associated construction activities covering the Proposed Development within the Order Limits with the exception of the Pentir Substation extension (see FCA Volumes 1 and 2 respectively), the and cable sealing end compounds (THH/CSECs) and their associated tunnel construction compounds (see FCA Volume 3 - **Document 5.12.2.3**) and the permanent access tracks associated with the THH/CSECs (see FCA Volumes 2 (**Document 5.12.2.2**) and 3 respectively (**Document 5.12.2.3**)).

1.2.2 This Volume includes all permanent operational infrastructure for the 400 kV OHL and associated third party works.

1.2.3 This Volume also covers all construction works and associated activities relating to the construction of permanent OHL infrastructure. These include temporary access tracks, access track watercourse crossings, conductor-pulling positions, construction compounds, pylon working areas, scaffolding and bridge/culvert working areas.

1.2.4 This assessment has been undertaken on the basis of the locations of Proposed Development elements set out in the Works Plans (**Document 4.4**). It is acknowledged that pylon locations could move within the Order Limits, subject to the Limits of Deviation (LOD) set out in Chapter 6 (**Document 5.6**). Chapter 6 also identifies a range of other constraints to movement and concludes that pylons will typically remain at the locations set out in the Works Plans (**Document 4.4**). Further constraints on the movement of pylons and temporary construction infrastructure within the Order Limits are specified in the Schedule of Environmental Commitments (**Document 7.4.2.1**). Taking into account these constraints and the measures identified in the CEMP (**Document 7.4**), it is considered that movement within the Order Limits would not alter the conclusions of this assessment.

1.2.5 FCA Volume 4 (**Document 5.12.2.4**) has been prepared in accordance with the planning and guidance set out in FCA Volume 1, sections 2.1, 2.2 and 2.3 (**Document 5.12.2.1**). FCA definitions are provided in FCA Volume 1, section 2.4 (**Document 5.12.2.1**) and climate change guidance is set out in FCA Volume 1, section 2.5 (**Document 5.12.2.1**).

1.3 OVERVIEW OF THE OVERHEAD LINE ROUTE

1.3.1 The Proposed Development within the Order Limits is summarised in FCA Volume 1, section 1.4 (**Document 5.12.2.1**). A detailed description of the Proposed Development is provided in ES Chapter 3 Description of Proposed Development (**Document 5.3**). An overview of the Order Limits is shown in Figure 12.2 (**Document 5.12.1.2**). The route of the OHL involves:

- Sections of new 400 kV overhead line (OHL) between Wylfa substation and Braint Tunnel Head House (THH) and Cable Sealing End Compound (CSEC) on Anglesey including modifications to parts of the existing 400 kV OHL between Wylfa and Pentir;
- Tunnel between Braint and Tŷ Fodol THHs;
- New section of 400 kV OHL between Tŷ Fodol THH and CSEC and Pentir Substation.

1.3.2 The Order Limits between Wylfa and Pentir are divided into six sections (see Figure 12.2 (**Document 5.12.1.2**)) as follows:

- **Section A -** Wylfa to Rhosgoch
- **Section B -** Rhosgoch to Llandyfrydog
- **Section C -** Llandyfrydog to B5110 North of Talwrn
- **Section D -** B5110 North of Talwrn to Ceint
- **Section E -** Ceint to the Afon Braint
- **Section F -** Afon Braint to Pentir.

1.4 APPLICABLE REFERRALS TO VOLUME 1

1.4.1 Reference should be made to FCA Volume 1 (**Document 5.12.2.1**) when reading FCA Volume 4. Specifically, it should be consulted for additional information regarding the following:

FCA Policy and guidance (FCA Volume 1, section 2.1 - 2.3)

FCA definitions (FCA Volume 1, section 2.4)

Climate change requirements (FCA Volume 1, section 2.5)

Data sources (FCA Volume 1, section 2.6)

FCA consultation and scope (FCA Volume 1, section 3)

FCA methodology (FCA Volume 1, section 4)

1.4.2 **FCA mitigation** (FCA Volume 1, section 5)

1.5 VOLUME 4 STRUCTURE

1.5.1 The structure of FCA Volume 4 (**Document 5.12.2.4**) is as follows:

- **Section 1 -** Introduction: sets out the context of this volume within the wider FCA and defines its scope and structure;
- **Section 2 -** Study Area: describes the study area baseline, including climate, topography, geology, hydrogeology, soils, landuse, hydrology and flood risk;

- **Section 3 -** Flood Hazard Identification: describes the baseline flood hazards that may affect the Proposed Development, including potential changes in the baseline over the lifetime of the Proposed Development;
- **Section 4 -** Receptor Flood Risk: defines the main receptor groups that could be affected and the process of individual receptor identification;
- **Section 5 -** Flood Risk Assessment: assesses flood risk to the main receptor groups and identifies mitigation measures;
- **Section 6 -** Flood Risk Management: describes the flood risk management measures to be adopted within the design, construction and operation of the Proposed Development;
- **Section 7 -** Planning Requirements: applies the Sequential and Exception Tests as necessary to meet planning requirements; and
- **Section 8 -** Summary and Conclusions: summarises the main points arising from the FCA carried out in this volume.

2 Study Area

2.1 INTRODUCTION

2.1.1 ES Chapter 3, Description of the Proposed Development (**Document 5.3**), Chapter 7, Landscape Assessment (**Document 5.7**), Chapter 11, Geology, Hydrogeology and Land Conditions (**Document 5.11**) and Chapter 12, Water Quality, Resources and Flood Risk (**Document 5.12**) provide details of the physical characteristics of the area through which the Order Limits pass. The information in this section includes only information deemed of relevance to this FCA Volume.

2.2 CLIMATE

2.2.1 The annual average rainfall at Valley (west of the Order Limits) is 841 mm (Ref 29). The highest average monthly rainfall is 102 mm, occurring in October and November. The lowest average monthly rainfall (48 mm) occurs in May. The north-west and central regions of the Order Limits receive less annual rainfall (600 to 1100 mm) than the south-east (1100 to 1400 mm), due to the orographic effects of Snowdonia.

2.3 TOPOGRAPHY

2.3.1 The Order Limits traverse the island of Anglesey from Wylfa in the north (NGR 235288 393751) at an elevation of 18 m AOD to the THH/CSEC at Braint (NGR 251652 371018) approximately 1.3 km from the Menai Strait at an elevation of 35 mAOD. The locations of these features are shown in Figure 12.2 (**Document 5.12.1.2**).

2.3.2 Anglesey is relatively low lying (see Figure 12.9 (**Document 5.12.1.9**)) - the highest point being Holyhead Mountain at 220 mAOD. The highest point along the Order Limits on Anglesey is approximately 80 mAOD (Order Limits Section C). The lowest point within the Order Limits is east of Llangefni where a proposed access track crosses the Afon Ceint at an elevation of 7.5 mAOD (Order Limits Section D).

2.3.3 On the mainland levels along the Order Limits range from 82 mAOD at the Tŷ Fodol THH/CSEC site (NGR 254658 368363), rising to 107 mAOD at Pentir Substation (NGR 255176 368172). Pentir Substation is the highest point within the Order Limits.

2.4 GEOLOGY, HYDROGEOLOGY AND SOILS

2.4.1 Much of the route is underlain by low permeability, superficial deposits of Glacial Till which comprise dense clays but also silts, sands gravels and boulders. There are small bands of more permeable Alluvium distributed along much of the Order Limits.

2.4.2 The generally low permeability of the superficial deposits impedes infiltration. The British Geological Society (BGS) Susceptibility to Groundwater Flooding Maps (Figure 12.12) (**Document 5.12.1.12**) show a varied pattern across the length of the Order Limits. The susceptibility is largely a reflection of the local topography, with the flatter, lower flood plain areas having the greatest susceptibility.

2.4.3 The soils along much of the route are dominated by two key types; the most prevalent being slowly permeable, seasonally wet acidic loamy and clayey soils. The other soil classification is freely draining loam, which is most prevalent in sections D, E and F. This is the only soil type encountered within the Order Limits in Gwynedd.

2.5 LAND USE

2.5.1 Throughout the Order Limits, land use is predominantly agricultural, mostly pasture with discrete areas of mixed and arable land and isolated areas of woodland. On Anglesey there are a large number of farms that are within close proximity to the Order Limits as well as a number of relatively small urban developments.

2.5.2 The most significant infrastructure in the vicinity of the Order Limits on Anglesey are the A5 and A55 trunk roads and the Bangor to Holyhead railway line. These cross the Order Limits close to the Braint THH/CSEC site.

2.5.3 Table 2.1 summarises the land uses and any significant infrastructure or environmental considerations along each of the sections.

Table 2.1: Summary of land use for each section

Section	Summary of land use

Table 2.1: Summary of land use for each section	
Section	Summary of land use
A	A predominantly rural section that contains the existing Wylfa Nuclear Power Station at the western extent. The A5025 is the most significant road close to the power station. There are two additional minor road crossings. The most significant settlement is Llanfechell, 200 m to the south-west of the Order Limits. A tributary of the Afon Wygyr passes through Llanfechell flowing east to the Order Limits and a watercourse crossing. There is a sewage treatment works approximately 100 m downstream of this crossing, west of the Carrog Isa farm. This section passes in close proximity to several farmsteads and/or residential dwellings.
B	The Llyn Alaw reservoir, lies 500 m to the west of the Order Limits downstream of five access track watercourse crossings. There are a number of farmsteads and/or residential dwellings to either side of the Order Limits. The most significant settlement is Rhosybol to the north of the Order Limits, which lies along the B5111.
C	This section passes the western and southern extents of the Cors Erddreiniog National Nature Reserve and part of the Anglesey Fens Special Area of Conservation. There are two access track watercourse crossings upstream of this nature reserve. Cefni reservoir lies 2 km to the west of the Order Limits, with several watercourses flowing from the Order Limits towards it. This section passes to the west of Maenaddwyn, over and to the east of Capel Coch and in close proximity to several farmsteads and/or residential dwellings. There are a number of minor road crossings, including the B5110.
D	A comparatively short section that passes close to Llangefni, west of the Order Limits and Talwrn to the east. There a number of watercourse crossings upstream of Llangefni, including two proposed bridge crossings of tributaries to the Afon Ceint, south west of Talwrn. The watercourses flowing through Talwrn flow towards the Order Limits.

Table 2.1: Summary of land use for each section	
Section	Summary of land use
E	This section includes the A5 and A55 main roads and railway crossings. There is light industrial development close to this transport infrastructure, including warehouses, a small industrial estate and chicken farm, along the minor road heading south-west from the A5 and over the railway line in close proximity to Star.
F	Much of this section is tunnelled, but also includes lengths of OHL in both Anglesey and Gwynedd. On Anglesey, there is a short length (less than 0.5 km long) of OHL extending westwards from the Afon Braint to Braint THH/ CSEC. In Gwynedd, From the Tŷ Fodol THH/ CSEC , heading east, the OHL traverses the steep narrow wooded valley of the Nant-y-Garth before crossing agricultural land around the Pentir Substation.

2.6 HYDROLOGY

2.6.1 Given the low permeability of much of the soil and superficial geology found along the Order Limits, the watercourses in the western and central area of Anglesey have a relatively low baseflow index (Ref 21) of approximately 0.4; this is indicative of catchments in which stream flow is dominated by surface water inflows as opposed to groundwater. As such, Anglesey has a relatively large number of streams, ditches and land drains throughout the Order Limits. East of Llangefni the baseflow index increases, coinciding with limestone bedrock geology. By contrast, the baseflow index for the Nant-y-garth on the mainland (Section F) is 0.68.

2.6.2 An indication of the drainage network on Anglesey and throughout the route is shown in Figure 12.2 (**Document 5.12.1.2**). The Order Limits include 12 crossings of Natural Resources Wales (NRW) designated 'Main Rivers' (MR) and 39 crossings of 'Ordinary Watercourses' (OW - defined as all other watercourses and includes formal land drains and fens, also referred to as 'Issues'). No NRW or other stream flow gauges are in operation in and around the Order Limits and thus it has not been possible to provide a summary of observed flow statistics.

2.6.3 River catchment areas on Anglesey are generally not greater than 25 to 30 km^2. The Order Limits intersect the largest catchment on the Island, Afon Alaw, which includes the Llyn Alaw reservoir. There is a total of 33.2 km^2 draining into Llyn Alaw, which is located approximately 2 km south of the Order Limits. The upper Afon Braint flows south approximately 380 m to the west of the Braint THH/CSCE site and has a catchment area of 29.5 km^2 at this location.

2.6.4 In Gwynedd there are no significant watercourses close to the OHL between Tŷ Fodol and Pentir Substation. The OHL crosses a tributary of the Nant-y-garth which lies within a deeply incised valley. The catchment area of the Nant-y-garth tributary is 4.3km^2.

2.6.5 Given the low permeability of much of the soils and superficial geology on Anglesey, there is a high propensity for the occurrence of surface water flows and flooding as indicated by NRW surface water flood mapping (see Figure 12.2, **Document 5.12.1.2**). While surface water flows frequently occur in areas adjacent to watercourses, they also occur in low lying areas due to ponding. This is especially evident in Sections E and F where the Order Limits cross the A55. However, the occurrence of surface water flows is less evident in Gwynedd (see Figure 12.2., **Document 5.12.1.2**).

3 Flood Hazard Identification

3.1 FLOOD HAZARD OVERVIEW

3.1.1 Sections 3.2 to 3.8 describe the baseline flood hazards that may affect the Proposed Development (OHL). Section 3.9 examines potential changes in the baseline over the lifetime of the OHL.

3.1.2 The details of the approach to identifying flood hazards is provided in FCA Volume 1, section 4.3 (**Document 5.12.2.1**), where the methods, data and other sources of information are also described. Overviews of fluvial, surface water and groundwater flood risk within the Order Limits are provided in Figures 12.10, 12.11 and 12.12 (**Documents 5.12.1.10, 5.12.1.11 and 5.12.1.12**) respectively.

3.1.3 As stated in FCA Volume 1, section 4.3 (**Document 5.12.2.1**), in assessing third party risk the geographic scope of the flood hazard search is based on the Order Limits with the addition of a 250 m buffer. However the search area was extended to 1 km beyond the Order Limits in special cases where it was considered that the impacts of, for example, the construction of a culvert, might potentially propagate further than 250 m upstream or downstream of the Order Limits.

3.1.4 A summary of the external flood hazards present along the route is presented in Table 3.1 while internal flood hazards are presented in Table 3.2. Note that where the hazard is deemed to be negligible or low, this is highlighted and the hazard has not been considered further. The subsequent sections present more specific details of those flood hazards identified in Tables 3.1 and 3.2 as needing further assessment.

3.1.5 Tables 3.1 and 3.2 specify numbers of instances of Proposed Development OHL elements coinciding with flood risk areas, which are based on the indicative layout shown in Figure 12.2 (**Document 5.12.2.2)**.

Table 3.1: Summary of external flood hazard			
Source	**Hazard**	**Description**	**Subject to further assessment**
Fluvial	**High**	There are nine locations where construction activities and/or pylons would wholly or partially coincide with NRW Flood Zones 2/3 and Welsh Government Development Advice Map (DAM) Zone C2. There are a further seven locations where construction activities and/or pylons would coincide only with DAM Zone B. There are three further locations where DAM Zone B intersects the Order Limits but for where no construction activities and/or pylons would be located. There are approximately 35 locations where construction activities and/or pylons would wholly or partially coincide with mapped areas of surface water flood risk (for the 3.33% and 1% AEP events) which is could be indicative of a potential flood hazard from small watercourses for which no NRW or DAM flood mapping has been produced (typically if catchment areas are less than 3 km^2 they are not routinely modelled, as confirmed by NRW – see **Annex 5.12.1.3B**). This is discussed further below under surface water flooding.	**YES**

Table 3.1: Summary of external flood hazard			
Source	**Hazard**	**Description**	**Subject to further assessment**
Surface Water	**High**	According to NRW surface water flood mapping (see Figure 12.11) (**Document 5.12.1.11**), there are approximately 35 locations where the Order Limits are intersected by surface water flood zones. Most of these locations are adjacent to watercourses and can be broadly split into those zones characterised by a relatively widespread extent, and those characterised by narrow extents confined to narrow flood extents along watercourse margins. There are a small number of mapped areas of surface water flooding that are not adjacent to watercourses such as isolated areas corresponding with localised low points.	**YES**
Groundwater	**High**	According to the BGS groundwater flooding susceptibility mapping (see Figure 12.2, **Document 5.12.1.2**), approximately 20 locations throughout the route coincide with Groundwater Flood Zone C (potential for groundwater flooding at the surface). In some areas, particularly in the north and the south of Anglesey, the area of Groundwater Flood Zone C is quite extensive. However, this would apply only to the construction activities as, in the case of pylons, no significant threat is posed to pylons by groundwater flooding.	**YES (construction only)**

Table 3.1: Summary of external flood hazard			
Source	**Hazard**	**Description**	**Subject to further assessment**
Sewer	**Negligible**	Dwr Cymru Welsh Water (DCWW) has confirmed only three minor instances of sewer flooding within the Order Limits relating to a single pumping station malfunction and with two instances of foul sewers becoming blocked and surcharging through manholes. Isle of Anglesey County Council (IACC) provided records of 37 reported flood incidents in and around the Order Limits between 1999 to June 2016. Incidents include fluvial flooding, stream blockage, surcharged sewers, inundated cellars, blocked drains and gullies, and highways flooding. Only five occurred within the Order Limits although details were only made available for two of them (watercourse blockage and heavy rainfall). Gwynedd Council has no records of flooding for the area of interest between Tŷ Fodol THH /CSECand Pentir Substation.	**NO**
Flooding from Artificial Sources	**Negligible**	Although the route is close to Llyn Alaw and the Cefni Reservoir, the route is upstream of both water bodies and thus the Proposed Development is not at risk of flooding from a dam breach. There are a few very small ponds near the Order Limits but risk of flooding from these sources is negligible. There are no canals on Anglesey. While there is a small (0.5km^2 area) surface water reservoir to the south east of Pentir Substation at the eastern end of the Order Limits, there is a valley to the north-east in which a small watercourse is located and any flood water arising from a breach in the reservoir would follow this flowpath away from Pentir Substation.	**NO**

Table 3.2: Summary of internal flood hazard

Table 3.2: Summary of internal flood hazard			
Floodplain Displacement	**Low**	This could affect project elements and third party receptors due to increased flood levels arising from loss of floodplain storage where project elements are constructed in floodplains. Examples would include temporary soil stockpiles, access tracks if raised above existing ground level and/or ramped up to cross watercourses. Only one pylon is wholly located in NRW Zone 2/3 and DAM Zone C2 with one other coinciding with the margins of NRW Zone 2/3 and DAM Zone C2.	**YES**
Fluvial Flow Obstruction	**High**	Fluvial flow may be impeded as a result of inappropriately sized culverts and bridges on access track watercourse crossings and/or from the blockage of culverts or bridges. There are approximately 50 proposed watercourse crossings for which a combination of bridges and culverts are proposed (see Figures 12.10 and 12.11, **Documents 5.12.1.10 and 5.12.1.11**).	**YES**
Surface Water Flow Obstruction	**Medium**	Surface water flowpaths may be impeded as a result of construction activities creating topographic obstructions such that surface water could be pooled behind the obstruction, thus creating an additional flood hazard (see Figure 12.11, **Document 5.12.1.11**).	**YES**
Surface Water Flooding (Internal)	**High**	Internal surface water flooding may arise as a result of inappropriate and/or insufficient water management measures leading to rapid runoff and localised surface water flooding that may affect all construction activities throughout the route.	**YES**

3.2 FLUVIAL FLOOD RISK (EXTERNAL)

Hazards Based on Fluvial Flood Mapping

3.2.1 This assessment of fluvial flood risk based on available flood mapping considers the following main elements of the overhead line construction and operation (see **Document 5.4.1.1**):

- New pylons (temporary, existing and existing modified pylons are not included in the assessment);
- Pylon working areas for both new and existing modified pylons;
- Access tracks;
- Watercourse crossings;
- Bridge working areas;
- Scaffold working areas;
- Conductor pulling positions;
- Drainage areas;
- Construction compounds;
- Undergrounding third party assets (shown in **Document 5.4.1.2**).

3.2.2 NRW Flood Zone mapping (see Figure 12.10) (**Document 5.12.1.10**) provides an indication of the probability of flooding from fluvial or tidal sources in any given year, known as the annual exceedance probability (AEP). NRW Flood Zones 1, 2, and 3 respectively indicate areas with a <0.1%, 0.1% and 1% AEP of flooding.

3.2.3 NRW and Welsh Government Development Advice Map (DAM) flood mapping for the route are shown in Figure 12.10 (**Document 5.12.1.10**). Any area not otherwise highlighted on Figure 12.10 as NRW Flood Zone 2 or 3 is assumed to be Flood Zone 1. Any DAM Zone not shown on Figure 12.10 as either Zone B or C2 is assumed to be Zone A. There are areas of DAM Zone C1 within the Order Limits.

3.2.4 According to the NRW and DAM flood mapping, and as shown in Table 3.3 (and see Figure 12.10 (**Document 5.12.1.10**)), the Order Limits intersect NRW Flood Zone 2/3 and DAM Zone C2 at nine locations. There are a further ten locations at which the Order Limits intersect only DAM Zone B. It

is however noted that the NRW and DAM flood mapping is limited to catchments in excess of 3 km^2.

3.2.5 Fluvial flood modelling is not routinely undertaken for catchments with areas less than 3 km^2 and thus no mapping is available for these locations. However, that does not preclude flood hazards arising from these smaller watercourses and this issue is discussed in the following section on 'Hazards Small Watercourses'.

3.2.6 Table 3.3 provides a breakdown of those OHL construction activities that coincide with NRW and DAM flood mapping, which can be summarised as follows:

- One new pylon (4ZA042) is located entirely within DAM Zone C2 / NRW Zone 2/3, one new pylon (4AP070) partially coincides with the margins of NRW Zone 2/3 / DAM Zone C2, and two new pylons (4AP033 and 4AP051) are located only in DAM Zone B;
- Three pylon working areas are wholly or partially located in DAM Zone C2 and NRW Zone 2/3 and four pylon working areas are located only in DAM Zone B;
- There are seven areas of DAM Zone C2 and NRW Zone 2/3, and three areas of DAM Zone B only mapping in which multiple sections of access track are located;
- There are three areas of DAM Zone C2 and NRW Zone 2/3, and two areas of DAM Zone B only mapping in which conductor pulling positions are partially located;
- There are eight areas of DAM Zone C2 and NRW Zone 2/3, and four areas of DAM Zone B only mapping in which drainage areas are located;
- There is only one area of DAM Zone C2 and NRW Zone 2/3 mapping in which scaffold work areas are located;
- There are nine areas of DAM Zone C2 and NRW Zone 2/3, and one area of DAM Zone B only mapping in which watercourse crossings are located;
- There are six areas of DAM Zone C2 and NRW Zone 2/3, and one area of DAM Zone B only mapping in which bridge working areas are located; and

- There are four areas of DAM Zone C2 and NRW Zone 2/3, and three areas of DAM Zone B only mapping in which areas of undergrounding of third party OHL works are located.

Table 3.3: Locations where the Order Limits intersect NRW and DAM mapped fluvial Flood Zones

Location	NGR at approximate centre of search area	Fluvial Flood Zones Intersected	Project Elements Identified
Near sewage treatment works to the east of Llanfechell	237394 391417	NRW 2/3 DAM C2	Access track Conductor pulling position Drainage area Scaffold work area Watercourse crossing Bridge working area
Near sewage treatment works to the east of Llanfechell	237394 391417	DAM B	Pylon working area Access track Watercourse crossing Bridge working area Undergrounding (third party)
North of Llyn Alaw	241100 388510	DAM B	None
To the east of Llyn Alaw	243301 386586	DAM B	Pylon (4AP033) Pylon working area Access track Undergrounding (third party)
To the east of Llyn Alaw	243399 386393	NRW 2/3 DAM C2	Access track Drainage area
Llandyfrydog	244587 385474	DAM B	Access track Pylon working area Conductor pulling position

Table 3.3: Locations where the Order Limits intersect NRW and DAM mapped fluvial Flood Zones			
Location	NGR at approximate centre of search area	Fluvial Flood Zones Intersected	Project Elements Identified
Llandyfrydog	244865 385569	NRW 2/3 DAM C2	Pylon (4ZA042) 2x Pylon working area Access track Watercourse crossing Bridge working area Conductor pulling position Drainage area Undergrounding (third party)
Between Llandyfrydog and Hebron	245081 384714	NRW 2/3 DAM C2	Access track Bridge working area Conductor pulling position Drainage area Watercourse crossing Undergrounding (third party)
West of the Anglesey Fens	246417 382478	DAM B	Conductor pulling position Drainage area
West of Anglesey Fens	246338 381684	DAM B	Pylon (4AP051) Pylon working area Drainage area
Southwest of Anglesey Fens	246091 381278	NRW 2/3 DAM C2	Undergrounding (third party)
South of Anglesey Fens	246853 380448	DAM B	None

Table 3.3: Locations where the Order Limits intersect NRW and DAM mapped fluvial Flood Zones			
Location	NGR at approximate centre of search area	Fluvial Flood Zones Intersected	Project Elements Identified
Northeast of Cefni Reservoir	247514 379027	NRW 2/3 DAM C2	Access track Watercourse crossing Bridge working area Drainage areas
Northeast of Cefni Reservoir	247590 378734	DAM B	Undergrounding (Third Party)
Northeast of Cefni Reservoir	247778 378152	DAM B	None
East of Llangefni	248426 375843	DAM B	None
East of Llangefni	248454 375724	NRW 2/3 DAM C2	Pylon (4AP070) Pylon working area Drainage area
East of Llangefni	248770 374634	NRW 2/3 DAM C2	Access track Watercourse crossing Bridge working area Drainage areas
Southwest of Llanfairpwll	251216 371135	NRW 2/3 DAM C2	Watercourse crossing Bridge working area Access track Drainage areas Undergrounding (third party)

Table 3.3: Locations where the Order Limits intersect NRW and DAM mapped fluvial Flood Zones			
Location	NGR at approximate centre of search area	Fluvial Flood Zones Intersected	Project Elements Identified
East of Tŷ Fodol	255297 368211	DAM B	Access track Watercourse crossing Bridge working area Undergrounding (third party)
Pentir	255779 367623	DAM B	Access track Watercourse crossings Drainage areas

Hazards from Small Watercourses

3.2.7 In addition to those instances of fluvial flooding highlighted in Table 3.3 where the Order Limits intersect NRW and DAM mapped flood zones, there are a further 35 instances where the Order Limits intersect small watercourses for which no flood mapping has been produced. An indication of those parts of the OHL at risk from these smaller watercourses is provided by the NRW surface water flood mapping (see Figure 12.11 (**Document 5.12.1.11**) and Table 3.4). This is discussed below, as part of the wider assessment of surface water flood risk.

3.3 SURFACE WATER FLOOD RISK (EXTERNAL)

3.3.1 NRW surface water flood risk extent mapping was reviewed and is shown in Figure 12.11 (**Document 5.12.1.11**). Three surface water flood zones were provided, 0.1% AEP, 1% AEP and 3.3% AEP events – only the 3.33% and 1% AEP extents were assessed. The mapping also comprises flow direction, velocity, depth and hazard (a function of depth and velocity) and depth data for the three scenarios although these elements were not assessed in detail.

3.3.2 Instances of elements within the Order Limits relating to the construction and corresponding with mapped surface water flood zones are shown in Table 3.4. There are 35 instances of surface water flood mapping (3.33%

and 1% AEP extents) throughout the Order Limits that coincide with construction activities. These are summarised as follows:

- Four new pylons (4ZA008, 4ZA017, 4AP027 and 4AP030);
- 13 pylon working areas;
- 28 sections of access track;
- 30 watercourse crossings;
- 12 bridge working areas;
- One scaffold working area;
- 10 conductor pulling positions;
- 16 drainage areas;
- 13 undergrounding of third party assets; and
- One construction compound.

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
Immediately northeast of Wylfa visitor centre Flooding around roads and roadside ditches	234423 393481	3.3% AEP 1% AEP	Conductor pulling position

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
200 m southeast of Wylfa visitor centre Flooding from MR up to 100 m from channel	235947 392694	3.3% AEP 1% AEP	1x Pylon (4ZA008) 2x Pylon working area Access track Watercourse crossing Bridge working area Conductor pulling position
250 m southeast of Wylfa visitor centre Flooding from OW >100m from channel	236097 392567	3.3% AEP 1% AEP	Access track
North of Llanfechell Flooding from OW up to 100m from channel	236826 391945	3.3% AEP 1% AEP	Pylon working area Access track 2x Watercourse crossing Undergrounding (Third Party OHL)
Around sewage treatment works east of Llanfechell Flooding from OW up to 70m from channel	237438 391412	3.3% AEP 1% AEP	Access track 3x Watercourse crossing 2x Bridge working area Drainage area Undergrounding (Third Party OHL)

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
ESE of Llanfechell Flooding from OW up to 80m from channel	238064 390930	3.3% AEP 1% AEP	Pylon (4ZA017) 2x pylon working area 3x watercourse crossings Drainage area Undergrounding (Third party OHL)
Southwest of Bodewryd Flooding from OW up to 5m from channel	239162 390235	3.3% AEP 1% AEP	Access track Watercourse crossing Bridge working area
North of Rhosgoch Flooding from OW up to 10 m from channel	240625 389436	3.3% AEP 1% AEP	Access track Conductor pulling position Undergrounding (third party OHL)
North of Llyn Alaw	241137 388598	3.3% AEP 1% AEP	Access track Watercourse crossing Undergrounding (third party OHL)
West of Rhosybol Flooding from MR up to 30m from channel	241673 388170	3.3% AEP 1% AEP	Pylon (4AP027) Pylon working area Access track Bridge working area Undergrounding (third party OHL)

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
West of Rhosybol Flooding from OW up to 20 m from channel	241934 387973	3.3% AEP 1% AEP	Access track Conductor pulling position Undergrounding (third party OHL)
South of Rhosybol Flooding from OW up to 10 m from channel	242251 387685	3.3% AEP 1% AEP	Access track 3x watercourse crossing Drainage area
South of Rhosybol Isolated and limited flooding away from channel	242423 387367	3.3% AEP 1% AEP	Pylon (4AP030) Pylon working area Access track 2x conductor pulling position Drainage area
East of Llyn Alaw Marginal flooding from LR at edge of Order Limits	243150 386856	3.3% AEP 1% AEP	Drainage area
East of Llyn Alaw Flooding from MR up to 80 m from channel	243314 386695	3.3% AEP 1% AEP	Access track

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
East of Llyn Alaw Flooding from MR up to 80 m from channel	243563 386401	3.3% AEP 1% AEP	Access track Watercourse crossing Drainage area
North of Llandyfrydog Flooding up to 5 m from OW	244102 385946	3.3% AEP 1% AEP	2x pylon working areas Access track 2x watercourse crossings 2x conductor pulling positions
East of Llandyfrydog Flooding from OW within 5 m of channel	244600 385562	3.3% AEP 1% AEP	Pylon working area Access track Watercourse crossing Bridge working area Undergrounding (third party OHL)
East of Llandyfrydog Marginal and limited flooding from OW within 10 m of channel	244970 385227	3.3% AEP 1% AEP	Conductor pulling position
East of Llandyfrydog Limited flooding adjacent to OW within 5 m	245115 384788	3.3% AEP 1% AEP	Access track 2x watercourse crossing 1x bridge working area

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones			
Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
ENE of Cefni Reservoir Flooding limited to within 5 m of MR	247488 379166	3.3% AEP 1% AEP	Access track Watercourse crossing Bridge working area Drainage area
ENE of Cefni Reservoir Flooding limited to within 5 m of MR	247718 378096	3.3% AEP 1% AEP	Access track Watercourse crossing
East of Cefni Reservoir Limited flooding within 5 m of an OW	247819 377702	3.3% AEP 1% AEP	Access track Watercourse crossing Drainage area
East of Cefni Reservoir Limited flooding within 10 m of an OW	248308 376551	3.3% AEP 1% AEP	Access track Watercourse crossing Bridge working area Drainage area Undergrounding (third party OHL)

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones

Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
East of Llangefni Flooding close but not adjacent to OW within 60 m of channel	248453 375453	3.3% AEP 1% AEP	Pylon working area Access track Watercourse crossing Bridge working area Drainage area Undergrounding (third party OHL)
East of Llangefni Flooding limited to within 10 m of OW	248555 375163	3.3% AEP 1% AEP	Access track Watercourse crossing Drainage area Construction compound
East of Llangefni Flooding limited to within 15 m of OW	248614 374537	3.3% AEP 1% AEP	Access track Watercourse crossing Drainage area Construction compound
Southeast of Llangefni Limited flooding not adjacent to an OW but within 20 m of channel	249227 373495	3.3% AEP 1% AEP	Access track
West of Llanfairpwll Flooding within 30 m of OW	250076 372221	3.3% AEP 1% AEP	Access track Watercourse crossing Bridge working area

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones			
Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
West of Llanfairpwll immediately south of A55 Flooding within 75 m of OW	250396 371854	3.3% AEP 1% AEP	2x Pylon working area Access track Watercourse crossing Scaffold working area Conductor pulling position Drainage areas Undergrounding (third party OHL)
West of Braint THH/CSEC Limited flooding within 10 m of OW	250857 371346	3.3% AEP 1% AEP	Access track Drainage area Undergrounding (third party OHL)
West of Braint THH/CSEC Limited flooding within 10 m of OW	250946 371152	3.3% AEP 1% AEP	Access track Watercourse crossing Bridge working area
East of Braint THH/CSEC Limited flooding within 5 m of OW and land drains	252081 370461	3.3% AEP 1% AEP	Drainage area

Table 3.4 Locations where the Order Limits intersect NRW mapped surface water flood zones			
Location & brief description of flooding	NGR at approximate centre of search area	Surface Water Flood Zones Intersected	Project Elements impacted
East of Braint THH/CSEC Limited flooding within 5 m land drain	252081 370461	3.3% AEP 1% AEP	Access track Drainage area Undergrounding (Third Party)
West of Pentir substation Limited flooding within 5 m of channel	255160 368151	3.3% AEP 1% AEP	Undergrounding (third party OHL)

3.4 GROUNDWATER

3.4.1 Groundwater flooding generally occurs after prolonged periods of rainfall when groundwater levels intersect the surface. Therefore, it is likely that if groundwater flooding were to occur, it would also coincide with episodes of fluvial and surface water flooding. However, groundwater flood events are generally of slower onset and longer duration and thus groundwater flooding of low lying areas and localised topographic depressions is likely to be longer-lasting that fluvial and surface water flood events.

3.4.2 The British Geological Society (BGS) groundwater flooding susceptibility mapping (See Figure 12.12) (**Document 5.12.1.12**) provides three risk classes, namely:

- A (limited potential for groundwater flooding to occur);
- B (potential for groundwater flooding of property situated below ground level); and
- C (potential for groundwater flooding to occur at the surface).

3.4.3 Throughout the route, the percentage of land within the Order Limits classed as A is 50%, B is 15% and C is 30%.

3.4.4 It can be seen from Figure 12.12 (**Document 5.12.1.12**) that the 'potential for groundwater flooding to occur at surface' category of the BGS groundwater flooding susceptibility data broadly corresponds with the topography and watercourse network. However, while groundwater flood risk is prevalent throughout the majority of the Order Limits, there is a section between the Afon Ceint in the south of Section C and throughout Section D in which groundwater is mostly classed as Groundwater Flood Zone A or with no classification at all.

3.4.5 Instances of elements within the Order Limits relating to the construction of the OHL corresponding with mapped groundwater flooding susceptibility mapping are shown in Table 3.5. As can be seen in Table 3.5, there are numerous instances where construction activities and new pylons would be located in Groundwater Flood Zones B and C (see Paragraph 3.2.6 re: scope for movement of project elements within the Order Limits post grant of a DCO).

Table 3.5: Instances of construction activities corresponding with BGS groundwater flooding susceptibility mapping zones B and C

Activity	Groundwater Flood Zone [1]	
	B	C
Pylons	29	18
Pylon working areas	49	32
Access tracks	35	23
Watercourse crossing	11	33
Bridge working area	2	11
Scaffold working area	19	7
Conductor pulling positions	26	17
Drainage area	18	24
Undergrounding (third party)	24	13
Construction compounds	1	1

Table 3.5: Instances of construction activities corresponding with BGS groundwater flooding susceptibility mapping zones B and C		
Activity	**Groundwater Flood Zone [1]**	
	B	**C**
Notes: [1] Groundwater Flood Zone classification is in accordance with the BGS system and does not relate in any way to the DAM flood mapping		

3.5 FLOOD STORAGE DISPLACEMENT

3.5.1 The coincidence of access tracks with mapped areas of fluvial flood risk cannot always be avoided (see Figures 12.10 and 12.11, **Documents 5.12.1.10 and 5.12.1.11**). There are estimated to be around 51 watercourse crossings, as show in the indicative watercourse crossing schedule (**Document 5.3.2.2**), and thus numerous instances where access tracks could be located in mapped flood areas or where there would be the potential for access tracks to ramp up to watercourse crossing decks. These could result in the displacement of flood storage volume.

3.5.2 Other sources of flood storage displacement within the Order Limits could include temporary stockpiles and pylon working areas.

3.6 FLUVIAL FLOW OBSTRUCTION

3.6.1 There would be approximately 51 watercourse crossings (see Figures 12.10 and 12.11, **Documents 5.12.1.10 and 5.12.1.11**) that would comprise either bridges or culverts. If not designed in accordance with best practice, crossings could give rise to, or increase, a flood hazard due to, for example, backwater effects arising from undersized culverts. Furthermore, floodplain flow conveyance could be obstructed if bridge/culvert decks and access track approaches were to create local barriers to flow.

3.6.2 Backwater effects from undersized culverts and topographic obstructions could not only cause or exacerbate a flood hazard at the immediate location of the crossing, but the effects could also propagate upstream and outside of the Order Limits, thus presenting a flood hazard to third parties including properties and infrastructure.

3.6.3 Flow obstruction could also occur due to a culvert or bridge opening becoming blocked by debris. Impacts from flow obstruction would mostly be localised although if the blockage went undetected and was not removed for

a significant period of time then the blockage could build up and effects could propagate upstream beyond the Order Limits. A watercourse would not necessarily have to be in flood for a blockage to occur. Moreover, blockages can easily go undetected in which time flood waters can rise quite rapidly.

3.7 SURFACE WATER FLOW OBSTRUCTION

3.7.1 Similar to the flood storage displacement hazard, the coincidence of access tracks with mapped areas of surface water flood risk cannot be avoided entirely (see Figure 12.11 (**Document 5.12.1.11**)). While it has been noted in section 3.3 that a significant portion of the areas of mapped surface water flood risk coincide with the river network and adjacent bank areas, there are nonetheless other locations throughout the Order Limits where overland flow may occur in areas that don't coincide with watercourses but may also be prone to obstruction.

3.8 SURFACE WATER FLOOD RISK (INTERNAL)

3.8.1 The development of temporary working areas, access tracks and hardstanding at pylon construction locations has the potential to increase the overall extent of lower permeability surfaces within the Order Limits. In the absence of effective surface water management measures, this could lead to an increase in peak runoff rates and therefore increase flood risk for downstream receptors, either via uncontrolled discharges into the watercourse network, or by overland flow.

3.8.2 Along much of the route, the soil is prone to waterlogging which may pose a risk when trafficking and working within the Order Limits. Impacts of compaction and the creation of tyre track ruts have been considered. Compaction has the potential to exacerbate the surface water flooding issue by reducing infiltration and soil storage. Ruts have the potential to act as preferential flow paths, particularly if directed downslope which may pose a flood hazard elsewhere if runoff is routed from a site.

3.8.3 If uncontrolled, discharges to watercourses could locally, along with other factors, increase the risk of flash flooding due to the rapid discharge of surface water that otherwise would have been attenuated as natural overland flow and the proportion of that runoff that would have been subject to infiltration. Uncontrolled overland flow could also impact local receptors without entering the stream network.

3.8.4 There are approximately 40 areas throughout the Order Limits that have been identified as drainage areas, typically occurring at strategic locations

adjacent to access roads and frequently shown connected to a watercourse. These areas would be used to provide temporary drainage provisions such as attenuation storage and water treatment.

3.8.5 Drainage areas within the Order Limits would typically drain access roads, pylon working areas and conductor pulling positions. Detailed, site-specific drainage management measures for all temporary construction infrastructure would be set out in the Drainage Management Plan (DMP), which would be prepared in accordance with Requirement 7 of the DCO. The DMP would be prepared to meet the requirements for mitigation set out in section 5 of this document, and would be subject to approval by the appropriate authority prior to commencement of works. The DMP would include formal drainage schemes for the construction compounds at Penmynydd Road and at Pentir.

3.9 FUTURE CHANGES TO BASELINE

Climate change

3.9.1 FCA Volume 1, section 2.5 (**Document 5.12.2.1**) gives an overview of climate change, including the relevant allowances for river flow, rainfall and sea level.

3.9.2 Climate change allowances applicable to this FCA volume are summarised in Table 3.6 for both river flow and rainfall, as explained in FCA Volume 1 (section 5) (**Document 5.12.2.1**).

Table 3.6: Summary of climate change allowances applicable to Volume 4 of the FCA

	Total potential change anticipated for 2020s	Total potential change anticipated for 2050s	Total potential change anticipated for 2080s
	River flow		
Operational	N/A	N/A	30% [1]
Construction	15%	N/A	N/A
	Rainfall		
Operational	-	-	20% [1]

Table 3.6: Summary of climate change allowances applicable to Volume 4 of the FCA			
Construction	5%	-	-
Table Notes: [1] 30% (flow) and 20% (rain) represent the change factor allowance (see FCA Volume 1, section 2.5 (**Document 5.12.2.1**)).			

Other development

3.9.3 Changing land use, in the form of changing agricultural land management practices, urban development, or the development of other infrastructure upstream of the Order Limits, could cause changes to the surface water environment in terms of patterns and rates of rainfall infiltration, flow pathways, morphological alteration of water bodies or the diversion of smaller watercourses and drainage ditches.

3.9.4 It is not possible to explicitly incorporate changing land use or unanticipated development into this FCA. However, it is possible to ensure that there is no increase in flood risk relative to the present-day baseline for the Proposed Development, and to incorporate allowance for climate change over its lifetime. This would reduce the potential for cumulative impacts on flood risk, which could arise from the Proposed Development and any other future development.

3.10 SUMMARY OF BASELINE FLOOD HAZARD

3.10.1 It has been shown that fluvial flood risk from both Main Rivers and Ordinary Watercourses is prevalent throughout the Order Limits on Anglesey. Surface water and groundwater flood risk are also prevalent throughout Anglesey, and to a lesser extent in Gwynedd between Tŷ Fodol THH/CSEC and Pentir Substation.

4 Receptor Flood Risk

4.1 INTRODUCTION

4.1.1 The methodology for identifying receptors is provided in Volume 1, section 4.4 (**Document 5.12.2.1**) where it is shown that receptors are combined into four receptor groups (RG1, RG2, RG3 and RG4). The four receptor groups are repeated below in Table 4.1.

4.1.2 In the following sections, the potential risk to receptor groups have been discussed in the context of there being no control and management measures in place (these are discussed in section 5).

Table 4.1: Receptor groups applicable to the construction, operation and maintenance of the OHL route corridor

Group	Type	Description	Flood risk vulnerability	Duration
RG1	Construction phase activities and temporary infrastructure	Personnel, plant and temporary infrastructure associated with the construction (of the OHL) and dismantling and refurbishment works of other associated infrastructure.	Essential Infrastructure[1] & Less Vulnerable[2]	Temporary
RG2	Operational phase infrastructure	Pylons (Note, there are no permanent access tracks and no permanent watercourse crossings associated with the overhead lines)	Essential Infrastructure[1]	Permanent

Table 4.1: Receptor groups applicable to the construction, operation and maintenance of the OHL route corridor				
Group	Type	Description	Flood risk vulnerability	Duration
RG3	Operational phase maintenance activities and temporary infrastructure	Personnel, plant and temporary infrastructure associated with inspection and periodic maintenance activities along the OHL.	Essential Infrastructure[1] & Less Vulnerable[2]	Temporary
RG4	Third party receptors	Third-party people, property and infrastructure within or outside of the Order Limits, including agricultural land.	Variable – see detailed assessment of specific third party receptors in the respective FCA volumes.	Temporary / Permanent

Notes:

[1] As discussed in FCA Volume 1, section 4.4 (**Document 5.12.2.1**)

[2] As discussed in FCA Volume 1, section 2 (**Document 5.12.2.1**) and it is further noted that Less Vulnerable applies equally to the TAN15 and NPS classification for construction and maintenance activities

4.2 FLUVIAL FLOOD HAZARD RECEPTORS (EXTERNAL)

Receptors Affected

4.2.1 Receptor groups RG1, RG2 and RG3 would potentially be affected by external fluvial flooding. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG2 represents pylons and RG3 represents maintenance activities during the operational phase. External fluvial flooding does not apply to RG4 receptors.

RG1 Fluvial Flood Risk (External)

4.2.2 It was shown in section 3.2 that there are nine locations where construction activities and/or pylons would wholly or partially coincide with NRW Flood Zones 2/3 and DAM Zone C2 and seven locations where construction activities and/or pylons would coincide only with DAM Zone B. Furthermore, there are approximately 35 locations where construction activities and/or pylons would wholly or partially coincide with mapped areas of surface water flood risk (for the 3.33% and 1% AEP events), assumed to be indicative of a potential fluvial flood hazard at locations where no NRW or DAM flood mapping has been produced.

RG2 Fluvial Flood Risk (External)

4.2.3 Throughout all stages of the evolution of Proposed Development the avoidance of locating pylons in floodplains has been one of the key considerations. As a result only one new pylon (4ZA042) is wholly located in NRW Flood Zone 2/3 and DAM Zone C2, one new pylon partially coincides with the margins of an area of NRW Zone 2/3 and DAM Zone C2, and two new pylons (4AP033 and 4AP051) are partially located in DAM Flood Zone B (see section 3.2).

4.2.4 Furthermore, as shown in section 3.3, four new pylons (4ZA008, 4ZA017, 4AP027 and 4AP030) are located in areas of mapped surface water flood risk which, as discussed in section 3.2, may indicate that they are actually in areas of fluvial flood risk but for where no NRW or DAM mapping can confirm or refute this assumption.

4.2.5 Lattice pylons, such as those proposed to be used (See ES Chapter 3 Description of Proposed Development, (**Document 5.3**)) would pose no material obstruction to water flow and therefore are not liable to extensive structural damage from what typically would be low velocity flood flows at the outer extent of floodplains.

4.2.6 Similarly, it is highly unlikely that waterborne debris could significantly damage a pylon such that it could not be repaired through standard maintenance activities; conductors are significantly elevated above ground levels such that they would not be at risk.

RG3 Fluvial Flood Risk (External)

4.2.7 The risk to RG3 receptors (maintenance activities during the operational phase) from external fluvial flooding would be limited since there would be

no permanent presence of personnel and temporary infrastructure in areas of flood risk along the OHL.

4.3 SURFACE WATER FLOOD HAZARD RECEPTORS (EXTERNAL)

Receptors Affected

4.3.1 Receptor groups RG1 and RG3 would potentially be affected by external surface water flooding. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG3 represents maintenance activities during the operation phase. RG2 is not affected because surface water flooding poses no risk to pylons. External surface water flooding is not applicable to RG4.

RG1 Surface Water Flood Risk (External)

4.3.2 As indicated in section 3.3, RG1 receptors would be at risk due to the extensive number of locations at which various project elements would coincide with NRW surface water flood mapping, as shown in section 3.3.

4.3.3 The geology, soils, topography and rainfall regime on Anglesey make it particularly conducive to the occurrence of surface water flooding and this is clear from the extensive coverage of mapped surface water flood risk on Anglesey (See Figure 12.11 (**Document 5.12.1.11**)).

4.3.4 During an intense rainfall event, sufficient to induce a surface water flood event, the saturated ground conditions and visibly flowing surface water would be apparent to construction workers. However, there may be areas within the Order Limits where surface water flowpaths could develop undetected and contribute to ponding. This could be particularly hazardous to drivers within the Order Limits, should areas of access tracks - and indeed off road areas accessed by 4x4 vehicles - coincide with areas of ponding. Construction workers, either on foot or in a vehicle, could become marooned on areas of locally high ground if surface water flooding is sufficiently widespread to surround them. This could be particularly dangerous if the water became too deep or fast flowing to walk or drive across.

4.3.5 Mapped surface water flood extent is less extensive south of the Afon Ceint i.e. the area south of Section C and throughout Section D, and in Gwynedd where the more active area within the Order Limits is located east of the Tŷ Fodol THH/CSEC site (as marked by multiple activities in Table 3.4).

RG3 Surface Water Flood Risk (External)

4.3.6 The risk to RG3 receptors (maintenance activities during the operational phase) from external surface water flooding would be limited since there would be no permanent presence of personnel and temporary infrastructure in areas of flood risk along the OHL. The only likely activities would be periodic inspection and maintenance of pylons, possibly to include refurbishment/replacement of conductors.

4.3.7 There may be occasions when operations and maintenance personnel need to access the site during prolonged periods of heavy rainfall but such occasions would be rare and subject to a Health and Safety risk assessment carried out at the time.

4.4 GROUNDWATER FLOOD HAZARD RECEPTORS

Receptors Affected

4.4.1 Receptor groups RG1 and RG3 could be affected by groundwater flooding. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG3 represents maintenance activities during the operation phase. RG2 is not affected because groundwater flooding poses no risk to pylons. Groundwater flooding is not applicable to RG4.

RG1 Groundwater Flood Risk

4.4.2 Table 3.5 showed the summary of areas within the Order Limits coinciding with groundwater flood zones and also provides a breakdown of the elements in the RG1 receptor group in terms of instances of locations that correspond with Groundwater Flood Zone C (potential for groundwater flooding to occur at the surface) and Groundwater Flood Zone B (potential for groundwater flooding of property situated below ground level).

4.4.3 As shown in Table 3.5, there are a number of locations along the Order Limits at which all of the various construction activities coincide with Groundwater Flood Zones B and C. As groundwater flooding does not usually happen rapidly the risk of RG1 receptors being rapidly exposed to groundwater flooding in Groundwater Flood Zone C would be very limited. With respect to Groundwater Flood Zone B, this would only be applicable for works relating to pylon foundations, third party undergrounding works and other activities involving excavations.

4.4.4 According to the 2016 IACC and Gwynedd Council Joint Local Development Plan (JLDP) Strategic Flood Consequence Assessment (SFCA) (Ref 8),

groundwater is not considered to be a significant source of flooding across Anglesey and Gwynedd.

RG3 Groundwater Flood Risk

4.4.5 The risk to RG3 receptors (maintenance activities during the operation phase) from groundwater flooding would be very limited since there would be no permanent presence of personnel and temporary infrastructure in areas of flood risk along the Order Limits. The only time when personnel would be present during operations is for refurbishment works. Moreover, groundwater flooding is unlikely to rapidly occur, thus further minimising the risk.

4.5 FLOOD STORAGE DISPLACEMENT RECEPTORS

Receptors Affected

4.5.1 Receptor groups RG1, RG2 and RG4 could be affected by the displacement of flood storage volume. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG2 represents pylons and RG4 represents third-party persons, property and infrastructure within or outside of the Order Limits.

RG1 Flood Storage Displacement

4.5.2 The risk to RG1 receptors arising from the displacement of flood storage volume is likely to be negligible. This is because the construction activities that may result in flood storage being displaced (i.e. access tracks and stockpiles) would be unlikely to displace significant volumes and thus any effects would be to be of low magnitude and very localised. Moreover, the impact of flood storage displacement would only be prevalent during a fluvial flood event in which case there would be no risk to construction activities or personnel because they would not be working in flooded areas.

RG2 Flood Storage Displacement

4.5.3 Due to the insignificant volume of water that could feasibly be displaced by pylon legs, combined with the majority of pylon foundations not being raised above existing ground levels, it is concluded that pylons have a negligible impact on floodplain displacement.

RG4 Flood Storage Displacement

4.5.4 The risk to RG4 receptors is assumed to be negligible since it would only be access tracks and stockpiles that could lead to flood storage displacement,

Access tracks and stockpiles are subject to control and management measures to mitigate this hazard.

4.5.5 It is acknowledged that some of the access tracks would be constructed in such a way that they would displace some floodplain storage (see ES Chapter 4 Construction, Operation, Maintenance and Decommissioning of the Proposed Development (**Document 5.4**)) but that due to the relatively small surface area coverage of access tracks, coupled with minimal raising above existing ground levels, the net impact to floodplain displacement throughout the Order Limits and to surrounding receptors would be negligible.

4.6 FLUVIAL FLOW OBSTRUCTION RECEPTORS

Receptors Affected

4.6.1 Receptor groups RG1, RG2 and RG4 could be affected by fluvial flooding arising from flow impedance caused by project elements within the Order Limits. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG2 represents pylons and RG4 represents third-party persons, property and infrastructure within or outside of the Order Limits.

RG1 Fluvial Flow Obstruction

4.6.2 RG1 receptors would be the receptor group at greatest risk of flooding from flow impedance arising from a blocked culvert or bridge. This is because the initial effects of a blockage would be likely to be localised and could impact workers and machinery located in the immediate area.

4.6.3 Furthermore blockages do not necessarily occur during flood events and thus construction workers may not be as vigilant as they otherwise would be if there was known and observable flooding elsewhere in the area. Also, blockages can go undetected and result in rapid onset of flooding with a greater potential to catch workers unaware than would be the case from fluvial flooding, where the rise in flood water is generally slower.

4.6.4 Fluvial flow obstructions may also be caused by undersized culverts not being sufficient to convey high flows. As a result watercourses may flow out of bank upstream of the undersized culvert and flow around and potentially over the culvert structure during high flow events.

RG2 Fluvial Flow Obstruction

4.6.5 In terms of scope for debris blockage at the base of a pylon, pylon legs are typically 7-13 metres apart (see Indicative Pylon Schedule in **Document 5.3.2.1**) and given that flow velocities at the outer extent of floodplains are low, it is highly unlikely that debris of sufficient size to block the base of a pylon could be transported by water.

RG4 Fluvial Flow Obstruction

4.6.6 If a culvert or bridge blockage went undetected for a significant period of time then it would be possible for the backwater effects to propagate upstream, beyond the Order Limits and impact RG4 third party receptors.

4.6.7 Similarly, the construction of raised tracks and ramps up to bridge decks could also result in backwatering effects that could potentially propagate upstream beyond the Order Limits, thus potentially impacting RG4.

4.7 SURFACE WATER FLOW OBSTRUCTION RECEPTORS (EXTERNAL)

Receptors Affected

4.7.1 Receptor groups RG1 and RG4 could be affected by surface water flooding arising from flow obstruction caused by elements of the Proposed Development within the Order Limits. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG4 represents third-party persons, property and infrastructure within or outside of the Order Limits. RG2 and RG3 would not be affected because there will be no obstructions post-construction.

RG1 Surface Water Flow Obstruction

4.7.2 RG1 receptors could be at risk of flooding if surface water flowpaths became obstructed (i.e. by stockpiles, equipment, temporary barriers such as newt fences etc.). In the first instance this would likely be localised and only impact workers and machinery located in the immediate area.

RG4 Surface Water Flow Obstruction

4.7.3 In the first instance, the effects of surface water flow path obstruction may be limited to areas within the Order Limits. However, if undetected, then a significant enough obstruction could result in an extensive area of surface water flooding beyond the Order Limits, thus impacting RG4 receptors.

4.8 SURFACE WATER FLOOD RISK RECEPTORS (INTERNAL)

Receptors Affected

4.8.1 Receptor groups RG1 and RG4 could be affected by internal surface water flooding arising from a failure to adequately manage surface water runoff within the Order Limits. RG1 represents personnel, plant and temporary infrastructure during the construction phase. RG2 and RG3 would not be affected because no runoff management will be needed post-construction.

RG1 Surface Water Flood Risk (Internal)

4.8.2 RG1 receptors would be at risk if surface runoff arising from construction activities within the Order Limits was not adequately managed in accordance with best practice. RG1 receptors would also be at particular risk given that the effects of inadequate water management would primarily be localised within the Order Limits. Uncontrolled surface water runoff does not pose a great hazard where flow rates are low and the water very shallow. However, where the topography allows, water may be channelled to low points where appreciable flood depths could occur.

4.8.3 Surface water management would ensure that water discharged from a formalised drainage system to a watercourse was controlled to the recommended Greenfield runoff rate. If discharges are not controlled then localised flash flooding could occur in the receiving watercourse if the area drained and rainfall volume is significant enough.

4.8.4 There are areas within the Order Limits where there would be more activities than in others (see those activities in Table 3.4), particularly in the vicinity of conductor pulling positions which are generally co-located with pylon working areas and scaffolding working areas. As such, not only would there be likely to be a greater density of construction workers, plant and temporary infrastructure in these areas, but the ground surface in these areas could generate runoff which could impact RG1 receptors.

RG4 Surface Water Flood Risk (Internal)

4.8.5 RG4 receptors would be at risk if surface water runoff arising from construction activities within the Order Limits was not adequately managed in accordance with best practice such that off-site receptors could be affected.

4.8.6 The implementation of the DMP secured through Requirement 7 of the draft DCO (**Document 2.1**) would ensure that water discharged from a formalised drainage system to a watercourse was controlled to the recommended

Greenfield runoff rate. If discharges are not controlled then localised flooding could occur in the receiving watercourse if the area drained and rainfall volume is significant enough.

4.8.7 There are areas within the Order Limits where there would be more activities than in others (see those activities in Table 3.4), particularly in the vicinity of conductor pulling positions which are generally co-located with pylon working areas and scaffolding working areas. As such, off-site areas near to these areas of the Order Limits may be at risk.

5 Flood Risk Assessment

5.1 INTRODUCTION

5.1.1 Having identified the applicable flood hazards in section 3 and presented hazards in the context of applicable receptors in section 4, this section combines the hazard and receptor information to summarise the assessment of flood risk to the main receptor groups. A determination is made as to whether the Exception Test should be applied, whether further assessment is required, and to specify appropriate mitigation measures, as shown in Table 5.1.

Table 5.1: Flood risk assessment summary

Flood Hazard	Location	Summary Of Risk	Receptor Group(s) Affected	Mitigation Required	Exception Test Required	Further Assessment Required	Comment
Fluvial (External)	Multiple locations along the route within the Order Limits	Fluvial flooding of areas of the Order Limits intersected by Main Rivers and Ordinary Watercourses	RG1 RG2 RG3	FM11F	**YES**	**NO**	Exception test required to be passed due to RG1 and RG2 being classed as Essential Energy infrastructure or Less Vulnerable and located in NRW Flood Zone 3/DAM Zone C2. The Exception Test is provided in section 7.3 of this volume. During the evolution of the design of the Proposed Development the Penmynydd Road Construction Compound was relocated out of FZ3. Given that the construction activities in flood zones would be unavoidable, the production of a robust Flood Management Plan (FMP) as part of **FM11** is required as mitigation, as specified in the CEMP (**Document 7.4**).

Surface Water (External)	Multiple locations along the route within the Order Limits	Surface water flooding of areas of land within the Order Limits, including adjacent to surface water flowpaths and in areas of ponding.	RG1	FM11	**NO**	**NO**	The production of a robust FMP as part of **FM11** is required as mitigation.
			RG3		**NO**	**NO**	
Groundwater	Throughout the route within the Order Limits		RG1	WE41-41 WE51-59 WE510-511HCMM8 FM11	**NO**	**NO**	Multiple control and management measures are required including specification of appropriate drainage strategies and DMP (**WE51-59, WE510-511**), dewatering plans (**WE41-43**) and provision of robust FMPs (**FM11**).
			RG3				
Flood Storage Displacement	Throughout the route within the Order Limits	Potentially arising from construction activities in floodplains.	RG1	FM11 FM139	**NO**	**NO**	Adherence to **FM13** would ensure that floodplain and surface water pathway obstructions would be minimised. The FMP (**FM11**) would address how construction activities and temporary construction infrastructure elements would be identified and screened against the respective flood hazards.
			RG2				
			RG4				

Fluvial Flow Obstruction	Throughout the route within the Order Limits	Fluvial flooding arising from flow conveyance being impeded, such as from inappropriately sized culverts on access track watercourse crossings or from blockage of culverts.	RG1 RG2 RG4	FM11 FM12 FM13 FM14	**NO**	**NO**	Multiple control and management measures are required including gaining requisite permits and consents (**FM12**), avoiding raised structures in floodplains (**FM13**), appropriate watercourse crossing design (**FM14**) and provision of robust FMPs (**FM11**).
Surface Water Flow Obstruction	Throughout the route within the Order Limits	Increase in surface water flooding resulting from topographic obstructions	RG1 RG4	FM13	**NO**	**NO**	Adherence to **FM13** would ensure that floodplain and surface water pathway obstructions would be minimised
Surface Water (Internal)	Throughout the route within the Order Limits	Flooding from surface water runoff arising from the implementation of inadequate surface water management and	RG1	WE41-43 WE51-59 WE510-511 FM11	**NO**	**NO**	Multiple control and management measures are required including specification of appropriate drainage strategies and DMP (**WE51-59, WE510-511**), dewatering plans (**WE41-43**) and provision of robust FMPs (**FM11**).

		drainage strategies					

6 Flood Risk Management

6.1 INTRODUCTION

6.1.1 This section provides references to more specific details of requisite flood risk management measures regarding drainage (section 6.2) and then discusses residual risk (section 6.3).

6.2 DRAINAGE

6.2.1 Requirements and consenting/permitting considerations are discussed in FCA Volume 1, section 5.3 (**Document 5.12.2.1**). A Drainage Management Plan (DMP) would be prepared, which would contain detailed drainage designs for the overhead line access tracks and working areas and the temporary construction compounds. The DMP would be prepared in line with the requirements of WE51-59 and WE510-511 of the CEMP (**Document 7.4**). The adequacy and implementation of the DMP would be secured in consultation with the applicable regulatory bodies (i.e. NRW, IACC and Gwynedd Council) via the CEMP, which in turn is secured through Requirements 6 and 7 of the draft DCO (**Document 2.1**).

6.3 RESIDUAL RISK

6.3.1 Residual risk is defined as that which remains after the flood risk management measures set out above have been taken into account. For example, site operatives undertaking works within the Order Limits subject to safety requirements contained within a FMP (i.e. near watercourses) would be at residual risk in the event of a flood in conjunction with the failure to identify and effectively disseminate flood warning information, as specified in the FMP.

6.3.2 The FMP (FM11) would address residual risk. Implementation of the FMP would ensure that any residual risk is proportionate to the scale, nature and location of the Proposed Development. NRW and the LLFAs approval of the FMPs would be required prior to the commencement of construction and operational activities. The CEMP, of which the FMP is a subsidiary plan, is a Requirement of the DCO. The CEMP is secured via Requirement 6 of the draft DCO (**Document 2.1**) and the FMP by Requirement7.

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7 Planning Requirements

7.1 FULFILMENT OF PLANNING REQUIREMENTS

7.1.1 This section applies the Sequential and Exception Tests to the Proposed Development. The requirements of the Sequential and Exception Tests are set out in FCA Volume 1, section 2.1 (**Document 5.12.2.1**).

7.2 SEQUENTIAL TEST

7.2.1 **Document 7.1** Project Need Case sets out the requirement for, strategic importance of, and thus the justification for, developing a new 400kV connection from the proposed Wylfa Newydd Power Station to the National Electricity Transmission System (NETS). This is also summarised in Chapter 1 of the Environmental Statement (**Document 5.1**).

Route selection process

7.2.2 The route of the OHL has been determined following detailed options appraisal undertaken in a number of stages. This process is summarised in ES Chapter 2 Alternatives and Proposed Development History (**Document 5.2**). The aim of the options appraisal process was to determine the location for the route and infrastructure, whilst reducing the potential impacts on the environment and local communities.

7.2.3 Due to the linear nature of the OHL, combined with the high number of watercourses present throughout the Order Limits, any route would have to traverse many higher risk flood zones. For this reason a sequential approach was adopted throughout the evolution of the design, with the aim of wherever possible avoiding any permanent infrastructure in NRW Flood Zone 2/3 or DAM Zone C2.

7.2.4 There is a total of 100 new pylons for Option A, 101 new pylons for Option B. As a result of this approach, notwithstanding scope for flexibility within the Limits of Deviation, only one new pylon (4ZA042) would be wholly located in NRW Flood Zone 3, one new pylon would partially coincide with the margins of NRW Flood Zone 2/3 and DAM Zone C2, two new pylons (4AP033 and 4AP051) would be partially located in DAM Flood Zone B, and one new pylon (4AP070) would be partially located in DAM Flood Zone C2. These

were unavoidable because of such factors as the need to site pylons a minimum distance apart to support the overhead line and at changes in direction, and where there were no suitable sites available within lower flood risk zones.

7.2.5 The Sequential Test has also been applied at the site specific level where appropriate. This includes the Penmynydd Road Construction Compound which, at the Stage 3 Consultation stage, was shown to be partially located in NRW Flood Zone 3. However, following consultation between the flood risk and design teams, the Compound has since been reconfigured so that no part would be located in NRW Flood Zone 2/3 and DAM Zone C2.

7.2.6 Other temporary construction works, such as access tracks to the pylon locations sometimes have to cross NRW Flood Zone 3 or DAM Zone C2. A number of conductor pulling positions and scaffold working areas would be located in NRW Flood Zone 3, however, these are determined by the pylon locations and locations at which public highways are crossed.

7.2.7 The 'need' for the development is set out in **Document 7.1**, as is the justification for the development. It has been shown that pylons have been sequentially located in NRW Flood Zone 1 wherever possible, and in recognising that the location of certain temporary construction activities NRW Flood Zones 2 and 3 or DAM Zone C would be unavoidable, it is concluded that the requirements of the Sequential Test are satisfied.

7.3 EXCEPTION TEST

7.3.1 As set out in FCA Volume 1, section 4.6 (**Document 5.12.2.1**), all permanent infrastructure (i.e. pylons) and associated construction phase activities, including access tracks, pylon working areas and watercourse crossings are classed as Essential Energy Infrastructure. In accordance with FCA Volume 1 (**Document 5.12.2.1**), Table 4.5, Essential Energy Infrastructure is appropriate in DAM Flood Zones A and B, but requires that the Exception Test is passed in order to be considered 'appropriate' development for DAM Flood Zone C2.

7.3.2 The Exception Test has three parts as summarised in FCA Volume 1, section 2.1 (**Document 5.12.2.1**). Both construction activities and permanent new pylons are considered together.

Part 1: Wider Sustainability Benefits

7.3.3 The Proposed Development would facilitate the export of power from the proposed Wylfa Newydd Power Station, thus aligning the Proposed

Development with national energy policy and the sustainability drivers therein (NPS EN-1, Ref 12.1.2).

7.3.4 Moreover, since the Proposed Development is critical to achieving the wider strategic aims associated with the construction of Wylfa Newydd Power Station, as set out in the National Policy Statement for nuclear power generation (NPS EN-6, Ref 12.1.34), then the wider sustainability benefits to the community associated with Wylfa Newydd Power Station are also pertinent to the wider benefits of constructing and operating the Proposed Development.

7.3.5 It is therefore concluded that Part 1 of the Exception Test is satisfied.

Part 2: Reasonable Alternative Sites

7.3.6 As shown in Chapter 2 of the Environmental Statement (**Document 5.2**) there are no reasonable alternative sites on previously developed land or methods of connecting the proposed Wylfa Newydd Power Station with the electricity transmission network.

7.3.7 Chapter 2 (**Document 5.2**) sets out the six Strategic Options that were considered for the connection, which were assessed based on: technology and cost; environmental considerations and socio-economic considerations. The assessment concluded that an overhead line connecting Wylfa and Pentir was the best option to achieve and appropriate balance between National Grid's technical, economic, amenity and environmental obligations.

7.3.8 Following the assessment of Strategic Options, four potential broad route corridor options were identified, with five possible locations for crossing the Menai Strait. These were assessed on the basis of environmental, socio-economic, technical and cost factors. The selected route significantly reduced potential environmental impacts compared to other options. Further detail, including consideration of each Section individually, can be found in Chapter 2 of the Environmental Statement (**Document 5.2**).

7.3.9 Therefore, it is concluded that Part 2 of the Exception Test is satisfied.

Part 3: Safety of the Project

7.3.10 Part 3 of the Exception Test requires that a FCA must demonstrate that a development would be safe over its lifetime, taking into account the vulnerability of the infrastructure itself and its users and that it would not increase flood risk to third parties. Where possible, flood risk should be reduced but this is not a mandatory requirement of the Exception Test.

7.3.11 In terms of temporary construction activities and infrastructure within the Order Limits, the implementation of a robust FMP would ensure that these activities would be as resilient as possible to occasional flooding. Moreover, temporary drainage measures would be incorporated to ensure that there would be no surface water flood risk to infrastructure or to third parties.

7.3.12 All construction phase activities and infrastructure to be located in NRW Flood Zone 3/ DAM Zone C would be in place for a limited period, owing to the phased nature of the construction works. Furthermore, mitigation measures that have been identified to control the risks and, via their inclusion in the CEMP (**Document 7.4**) and this FCA Volume, will be secured via DCO Requirement 6. The DCO Requirement would ensure that all measures are designed and implemented in accordance with current best practice, policy and guidance, as regulated by NRW, IACC and Gwynedd Council as applicable.

7.3.13 With reference to the proposed programme for construction (set out in section 2.8 of **Document 5.4),** construction activities will commence with the installation of temporary access tracks and establishment of construction compounds at a similar time across all the land within the Order Limits. However, although temporary access tracks and working areas would be in place throughout, actual construction activity would be in phases, interspersed with periods of little or no activity. This phased approach would reduce the likelihood of temporary construction works being in place at the time of a flood. Measures identified in Table 5.1 (and detailed in FCA Volume 1, section 5.3 (**Document 5.12.2.1**) would also ensure that there is no increased flood risk to third party receptors.

7.3.14 In the case of permanent new pylons, these would pose no material obstruction to water flow and therefore are not liable to extensive structural damage from what typically would be low velocity flood flows at the outer extent of floodplains. Moreover, it is highly unlikely that water borne debris could significantly damage a pylon such that it could not be repaired through standard maintenance activities and conductors are significantly elevated above ground levels such that they would not be at risk. In summary, pylons are resilient to flooding.

7.3.15 It is concluded that all construction activities, temporary infrastructure and permanent pylons located in NRW Zone 2/3 and DAM Zone C2 are consistent with the requirements of Part 3 of the Exception Test. It can therefore be concluded that the Exception Test has been passed for all the OHL infrastructure assessed in this volume.

8 Summary and Conclusions

7.4 SUMMARY

8.1.1 FCA Volume 4 (**Document 5.12.2.4**) has presented a detailed assessment of flood risk for the OHL and all associated construction activities. This volume was prepared in conjunction FCA Volume 1 (**Document 5.12.2.1**) which provides the overarching planning, guidance, scoping and methodologies applicable to this Volume.

8.1.2 External flood fluvial risk was shown to be prevalent throughout the OHL route (section 3.2) and it was highlighted that the risk also applies to watercourses with catchments of less than 3km^2 (for which mapping generally does not exist). It was shown that the surface water flood mapping provides a relevant proxy for flooding of these smaller watercourses and thus should be used to guide the formulation of detailed flood management plans (FMPs) in addition to the available NRW and DAM fluvial flood mapping.

8.1.3 Surface water and groundwater flooding was shown to be prevalent throughout the OHL route (sections 3.3 and 3.4), as guided by the respective NRW surface water flood mapping and the BGS flood mapping. This mapping would be used as the basis for the preparation of appropriate FMPs in order to effectively mitigate the risk from surface water and groundwater flooding. Furthermore, the risk of flooding from surface water and groundwater are also controlled by the specification of appropriate mitigation measures including FM11 (preparation of a Flood Management Plan) and FM13 (minimise raised structures in floodplain areas), as summarised in FCA Volume 1, section 5 (**Document 5.12.2.1**).

8.1.4 Information in section 5 has shown that in all instances where flood risk receptors could be impacted by an associated flood hazard, it has been appropriate to specify mitigation in accordance with the predetermined control and management measures outlined in FCA Volume 1, section 5.3 (**Document 5.12.2.1**) and that the incorporation of these measures in the design and construction stages would be sufficient to mitigate any potential increase flood risk due to the OHL.

8.1.5 Measures to mitigate flood risk during construction are specified in the CEMP (**Document 7.4**); adherence to these CEMP measures would be secured as DCO Requirement 6. The preparation of further, detailed construction phase management plans for flood risk and drainage (i.e. FMPs and DMPs) prior to commencement of the relevant stage of the works would also be secured by DCO Requirement 7. These plans would all be subject to approval by the relevant regulatory body (NRW, IACC or Gwynedd Council as appropriate). Furthermore, all watercourse crossings would be subject to either Flood Risk Activity Permits (FRAP, via NRW) or Ordinary Watercourse Consent (OWC, via LLFAs) as set out in FM12 (see FCA Volume 1, section 5 (**Document 5.12.2.1**)). Where plans apply to the safe operation of permanent infrastructure throughout its lifetime, schedules of periodic update, review and re-approval of management plans would be agreed with the applicable regulatory bodies.

8.1.6 This Volume also demonstrates that the Sequential Test (section 7.2) and Exception Test (section 7.3) have been appropriately applied and passed.

8.1.7 In summary, this FCA has demonstrated that the construction activities associated with overhead lines and operation and maintenance of the new pylons would be adequately protected from flooding during the construction and operational phases, and would not increase flood risk elsewhere, given that committed mitigation would be implemented. Further assessment would be required prior to decommissioning using the baseline environment and policies, guidance, and regulatory frameworks applicable at the time.