



SP MANWEB

The North Wales Wind Farms Connection Project

Environmental Statement Chapter 9 - Flood Risk and Water Quality

Application reference: EN020014

March 2015



Regulation reference: The Infrastructure Planning
(Applications: Prescribed Forms and Procedure)
Regulations 2009 Regulation 5(2)(a)

Document reference 6.9

North Wales Wind Farms Connection Project

Environmental Statement

Chapter 9 Flood Risk and Water Quality

March 2015

PINS Reference: EN020014

Document Reference: 6.9

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Planning Act 2008

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009**

Regulation 5(2)(a)

The North Wales Wind Farms Connection Project

Environmental Statement

Chapter 9 Flood Risk and Water Quality

Document Reference No.	6.9
Regulation No.	Regulation 5(2)(a)
Author	Mr B Sargent
Date	March 2015
Version	01
Planning Inspectorate Reference No.	EN020014

Table of Contents

9	Flood Risk and Water Quality	1
9.1	Introduction	1
9.2	Legislation and Policy Background	1
9.3	Consultation	7
9.4	Methodology	9
9.5	Baseline Context.....	13
9.6	Embedded Mitigation	17
9.7	Assessment of Effects	17
9.8	Specific Mitigation Measures	24
9.9	Assessment of Cumulative Effects	24
9.10	Summary of Residual Effects.....	25

Volume 6: Environmental Statement		
Document Reference	Chapter	Document
6.1	1	Introduction
6.2	2	Description of the Proposed Development
6.3	3	Alternatives and Design Evolution
6.4	4	EIA Methodology
6.5	5	Planning Policy Considerations
6.6	6	Ecology and Biodiversity
6.7	7	Landscape and Visual
6.8	8	Historic Environment
6.9	9	Flood Risk and Water Resources
6.10	10	Land Use and Agriculture
6.11	11	Socio-Economics and Tourism
6.12	12	Traffic and Transport
6.13	13	Emissions
6.14	14	Electric and Magnetic Fields
6.15	15	Summary of Environmental Effects
6.16		Environmental Statement Figures
6.17 – 6.26		Appendices
6.27		Glossary
6.28		Non-Technical Summary

This Chapter does not have any Appendices:

Reference is also made to the following documents:

DCO Document Reference	Document
5.3	Flood Consequences Assessment
6.17	Proposed Collector Substation; Clocaenog Forest; Environmental Report (Appendix 1.1 to this ES)
	Proposed Underground Cable; St Asaph Substation to the Terminal Point (Appendix 1.2 to this ES)
	Proposed Works at St Asaph Substation (Appendix 1.3 to this ES)
	Lower Voltage Diversions (Appendix 1.4 to this ES)
	Potential Connection Routes for the Derwydd Bach, Nant Bach and Brenig Wind Farms (Appendix 1.5 to this ES)
6.18	Construction Environmental Management Plan (Appendix 2.1 to this ES)
6.30	Scoping Opinion; Proposed North Wales Wind Farm Connections The Planning Inspectorate, February 2014
7.1	Design and Construction Report

9 FLOOD RISK AND WATER QUALITY

9.1 Introduction

- 9.1.1 This chapter assesses the effect of the Proposed Development on flood risk and water quality. In particular, it considers the potential effects of flooding on the Proposed Development and of flood risk to third parties caused by the Proposed Development, and the potential impacts of the Proposed Development on surface water quality within the Study Area. The Study Area for the purposes of this chapter is defined in Section 9.4 below. The potential impacts arising from both the construction, operational and decommissioning phases are assessed within this chapter. There is also an assessment of the potential for cumulative effects.
- 9.1.2 The chapter describes the methods used to assess the environmental effects, the baseline conditions which currently exist, the potential direct and indirect effects of the Proposed Development arising from flood risk and water quality, the mitigation measures required to prevent, reduce, or offset the effects and the residual effects.

9.2 Legislation and Policy Background

- 9.2.1 The assessment has been undertaken with due consideration of the requirements of key legislative and policy documents. General planning policy is discussed in Chapter 5: 'Planning Policy Considerations'. Legislation and policy specifically relevant to flood risk and water quality are outlined below.

Water Framework Directive

- 9.2.2 The Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. WFD is implemented across Wales and England through the Water Environment Regulations 2003. These Regulations aim to provide an integrated framework for the protection of the water environment through the delivery of actions set out in River Basin Management Plans (RBMPs).
- 9.2.3 The Directive aims to protect the water environment from deterioration, achieve the objectives of Protected Areas by 2015 (i.e. Habitats and Birds, Bathing Waters, Drinking Water, Freshwater Fish, Shellfish Waters, Nitrates, Urban Waste Water), aim to achieve WFD Good Ecological Status/Potential and Good Chemical Status for all surface waters (and the equivalent for ground waters) by 2015; and ensure new modifications to water bodies are in line with WFD objectives.

The Environmental Permitting (England and Wales) Regulations 2010

- 9.2.4 These regulations are issued made in exercise of the powers conferred by sections 2 and 7(9) of, and Schedule 1 to, the Pollution Prevention and Control Act 1999 and control activities that could cause water pollution and require operators to obtain a permit from the Natural Resources Wales (NRW) and comply with the conditions. If they do not, they will commit an offence. They could also face a notice requiring them to comply with the permit, or have their permit revoked or suspended.

The Overarching National Policy Statement for Energy (EN-1)

9.2.5 The Overarching National Policy Statement for Energy (EN-1) includes a number of requirements with respect to water quality and flood risk. Compliance with the requirements of EN-1 is indicated in Table 9.1 below.

Table 9.1: Compliance with NPS (EN-1) Requirements

Compliance with NPS (EN-1) Requirements	
NPS EN-1 Section	Covered in ES Section
<p>Para 5.7.4 Applications for energy projects of 1 hectare or greater in Flood Zone 1 in England or Zone A in Wales and all proposals for energy projects located in Flood Zones 2 and 3 in England or Zones B and C in Wales should be accompanied by a Flood Risk Assessment (FRA).</p>	<p>A ¹Flood Consequences Assessment has been undertaken and is provided in DCO Document Reference 5.3</p>
<p>Para 5.15.2 Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent.</p>	<p>An assessment of the existing status of the water environment and potential impacts of the Proposed Development upon it are included in this Chapter 9.</p>
<p>Para 5.15.3 The ES should in particular describe:</p> <ul style="list-style-type: none"> ● the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges; ● existing water resources 	<p>An assessment of the existing water quality is in Chapter 9. There are no discharges or abstractions and no changes to the physical characteristics of watercourses proposed, so these have not been considered further.</p> <p>There are no source protection zones affected by the Proposed Development.</p>

¹ NPS EN-5 refers to a Flood Risk Assessment. A Flood Consequences Assessment is a flood risk assessment to meet the requirements of TAN 15 in Wales. A Flood Risk Assessment is the terminology used in the NPPF which only applies to England.

Compliance with NPS (EN-1) Requirements	
NPS EN-1 Section	Covered in ES Section
<p>affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies);</p> <ul style="list-style-type: none"> • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and • any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions. 	

National Policy Statement for Electricity Networks Infrastructure (EN-5)

9.2.6 The National Policy Statement for Electricity Networks Infrastructure (EN-5) also refers to flood risk. The policy statement makes no reference to impacts on water quality arising from electricity networks. Compliance with the requirements of EN-5 is indicated in Table 9.2 below.

Table 9.2: Compliance with NPS EN-5 Requirements

Compliance with NPS (EN-5) Requirements	
NPS EN-5 Section	Covered in ES Section
Para 2.4.1 applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to...flooding, particularly for substations that are vital for the electricity transmission and distribution network.	A Flood Consequences Assessment has been undertaken and is provided in DCO Document Ref 5.3.

Technical Advice Note 15 (TAN15) Development and Flood Risk (2004)

- 9.2.7 TAN15 provides guidance, which supplements the policy set out in the Welsh Assembly Government's strategic land use policy framework in relation to development and flooding. It provides a framework within which risks arising from river and coastal flooding, and impacts to third parties arising from development can be assessed.
- 9.2.8 The guidance includes the definition of different flood zones, A, B and C, based on probability of flooding. Zone C is further sub-divided into Zone C1 and Zone C2. Zone C1 refers to areas with flood defences and Zone C2 being areas without any flood defences. All of Zone C refers to areas with an estimated probability of flooding of 0.1% or more (less than 1 in 1000 years return period). Table 9.3 provides more detail on these flood zones.
- 9.2.9 Paragraph 6.2 of TAN15 states that "new development should be directed away from Zone C land towards suitable land in Zone A, otherwise to Zone B, where river and coastal flooding will be less of an issue". The guidance recognises that in some cases development may be required in areas at risk of flooding (i.e. Zones B and C).
- 9.2.10 TAN 15 provides further guidance on land uses which are acceptable in the defined flood zones, and utilities infrastructure is classed as "less vulnerable development". It is therefore permitted in Zone C2 subject to meeting justification criteria defined in Section 6 of TAN15 and the provision of a Flood Consequences Assessment (FCA).

9.2.11 The Justification Test states that development will only be justified if it can be demonstrated that:

- its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or
- its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region; and
- it concurs with the aims of Planning Policy Wales (PPW) and meets the definition of previously developed land; and
- the potential consequences of a flooding event for the particular type of development have been considered and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 (which define the requirements of a Flood Consequences Assessment) found to be acceptable.

9.2.12 The latter requirement is met by the Flood Consequence Assessment (FCA) for the Proposed Development (DCO Document Ref 5.3).

Table 9.3: Flood zones as specified by TAN15 (reproduced from TAN15, Figure 1)

Description of Zone		Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

9.3 Consultation

- 9.3.1 In January 2014 SP Manweb's issued the 'North Wales Wind Farm Connections EIA Scoping Report' to the Secretary of State (SoS), who duly prepared a Scoping Opinion based on consultation with interested parties.
- 9.3.2 The consultation response received from Natural Resource Wales (NRW) referred to the need for a Flood Consequences Assessment (FCA) to be undertaken, and this requirement was noted by the SoS in the Scoping Opinion².
- 9.3.3 In response, consideration of flood risk is included in this Chapter and a Flood Consequence Assessment has been undertaken (DCO Document Ref 5.3).
- 9.3.4 The SoS in his scoping opinion stated "*Bearing in mind the potential effects of construction activities in particular, and that the route has the potential to interact with three main rivers, the SoS does not agree that water quality and resources can be scoped out.*" NRW also commented that "*We note that water quality and resources are proposed to be scoped out. We do not agree, and as part of the EIA we would expect that risks to groundwater resources and quality should be further considered.*" Denbighshire County Council similarly commented "*Flood Risk: This section should be expanded to also assess the impact of the proposal on hydrology and water supplies*".
- 9.3.5 Public Health England (PHE) commented that "*Consideration should also be given to environmental receptors such as the surrounding land, watercourses, surface and groundwater, and drinking water supplies such as wells, boreholes and water abstraction points.*"
- 9.3.6 This assessment therefore also contains consideration of water quality and groundwater resources.
- 9.3.7 Table 9.4 provides a summary of the SoS's Scoping Opinion and the elements within this Chapter that respond to the issues raised in the Scoping Opinion.

Table 9.4: Summary of Responses to SoS's Scoping Opinion

Issue Raised by SoS	Response
The SoS does not agree at this stage that water quality and resources can be scoped out of the EIA as no information has been provided by the applicant to justify such an approach (para 3.16 of Scoping Opinion).	Baseline water quality and water resources information is provided and potential effects on these have been assessed within this Chapter of the ES.

² Scoping Opinion; Proposed North Wales Wind Farm Connections'. The Planning Inspectorate, February 2014 (DCO Document Ref 6.30)

Issue Raised by SoS	Response
Consideration should also be given to whether the development itself has any potential to increase flood risk in the area, potential effects assessed if it is a possibility, and suitable mitigation measures identified if necessary (para 3.53 of scoping opinion)	The effects of the Proposed Development on flood risk in the area and to third parties has been included in this EIA and in the FCA (DCO Document Ref 5.3). Mitigation measures have been identified where necessary.
The study area must be clearly defined in the ES and all relevant features and receptors should be accurately described (para 3.54 of the scoping opinion)	This chapter defines the Study Area for flood risk and ensures all relevant features and receptors are identified.
No reference is made in this section to the provision of a Flood Consequences Assessment. Consideration should be given to whether one is required, and it is recommended that consultation is undertaken with NRW and other bodies as appropriate. If required, it should form an appendix to the ES (para 3.56 of scoping opinion)	A FCA has been undertaken and is provided as DCO Document Ref 5.3.
...potential effects on flood risk. The assessment should also consider effects as a result of excavation activities and construction and removal of access tracks.	The effects of these activities on flood risk and water quality are included in this chapter and in the FCA.
Bearing in mind the potential effects of construction activities in particular, and that the route has the potential to interact with three main rivers, the SoS does not agree that water quality and resources can be scoped out (para 3.57 of scoping opinion)	Water quality and resources have been considered in Chapter 9 of the ES

9.4 Methodology

- 9.4.1 The assessment of flood risk and water quality effects has followed the approach outlined in Chapter 2.0: Methodology and Significance Criteria, summarised as follows:
- the baseline flood risk and water quality characteristics of the study area are described and evaluated in terms of their sensitivity to change;
 - the magnitude of effects on flood risk and water quality which are likely to occur because of the construction and operation of the Proposed Development are described;
 - the significance of the likely effects is described, as a function of the sensitivity of the resource and the magnitude of the change;
 - mitigation measures proposed for reducing the effects of significant adverse effects are identified;
 - a cumulative effects assessment; and
 - any residual effects of the Proposed Development on flood risk and water quality are described.
- 9.4.2 The assessment methodology has been adapted from that originally published in the Design Manual for Roads and Bridges (DMRB) by the Highways Agency. It provides a good general assessment methodology which was used to assess new road proposals throughout England and Wales, until superseded by a scheme design specifically for road impacts on water chemistry in 2009. The methodology has been adopted and used extensively for many other linear infrastructure projects, including overhead power lines, for example the new 132kV overhead line connection from Llandinam Wind Farm to Welshpool substation, and continues to be in use for these purposes.
- 9.4.3 The assessment has been based entirely on published information and no surveys or field measurements have been taken specifically for this assessment. The study area for the assessment is 100 metres either side of the nominal centreline of the Limits of Deviation, extended to 200 metres within recognised floodplains to consider flood risk impacts on property downstream of the route as appropriate.
- 9.4.4 The overall baseline conditions have been assigned a sensitivity or importance based upon criteria shown in Table 9.5 below.

Table 9.5: Sensitivity / Importance Criteria

Sensitivity / Importance	Typical Descriptors	Typical Example	
Very High	Attribute has a high quality and rarity on a regional or national scale.	Surface Waters:	EC Designated Salmonid / Cyprinid fishery High Ecological Quality. Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site)
		Groundwater:	Major aquifer providing a regionally important resource or supporting site protected under wildlife legislation Source Protection Zone (SPZ) I
		Flood Risk:	Flood plain or defence protecting more than 100 residential properties from flooding
High	Attribute has a high quality and rarity on a local scale.	Surface Waters:	Good Ecological Quality Major Cyprinid Fishery Species protected under EU or UK wildlife legislation
		Groundwater:	Major aquifer providing locally important resourced or supporting river ecosystem SPZII
		Flood Risk:	Flood plain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.

Sensitivity / Importance	Typical Descriptors	Typical Example	
Medium	Attribute has a medium quality and rarity on a local scale.	Surface Waters:	Moderate Ecological Quality
		Groundwater:	Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZII
		Flood Risk:	Flood plain or defence protecting 10 or fewer industrial properties from flooding
Low	Attribute has a low quality and rarity on a local scale.	Surface Waters:	Poor or Bad Ecological Quality
		Groundwater:	Non-aquifer
		Flood Risk:	Flood plain with limited constraints and low probability of flooding of residential and industrial properties.

9.4.5 The magnitude of changes caused during the operation, construction and decommissioning phases are qualitatively described, based on the descriptions detailed in Table 9.6 below.

Table 9.6: Magnitude of Change Criteria

Magnitude of Potential Change		Criteria
High	Adverse	Results in loss of attribute and/or quality and integrity of the attribute
	Beneficial	Results in major improvement of attribute quality.
Medium	Adverse	Results in effect on integrity of attribute, or loss of part of attribute.
	Beneficial	Results in moderate improvement of attribute quality.
Low	Adverse	Results in some measurable change in attribute’s quality or vulnerability.
	Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.
Negligible		Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.

9.4.6 The significance of effects has been assessed using a matrix which correlates the importance of the attribute against the magnitude of the impact. This is reproduced in Table 9.7.

Table 9.7 Significance of Effect Criteria

		MAGNITUDE OF CHANGE			
		HIGH	MEDIUM	LOW	NEGLIGIBLE
IMPORTANCE OF ATTRIBUTE	Very High	Major	Major	Moderate	Negligible
	High	Major	Moderate	Minor	Negligible
	Medium	Moderate	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible

9.4.7 The sensitivity or importance of surface waters is determined by reference to the current ecological quality of the surface water receptor as determined by NRW under the Water Framework Directive. Where surface watercourses have not been assessed for ecological quality by NRW, and no other information is available to satisfactorily assess sensitivity or importance, a “good” ecological quality has been assumed.

9.5 Baseline Context

9.5.1 Average Annual Rainfall in the Study Area is around 1200 mm in the south of the 132 kV Overhead Line, declining to 800mm close to St Asaph. Whilst these averages are moderately high, this area is not as wet as higher areas lying to the south and west of the 132 kV Overhead Line.

9.5.2 The area generally drains east or north-east towards the Vale of Clwyd and the route thus crosses several tributaries of the Clwyd. Significant water features crossed by the 132 kV Overhead Line are shown in Table 9.

Table 9.8: Surface Water Features along the Route of the Proposed Development

NGR	Watercourse	Comment	Ref on Fig 9.1
SJ 022 607	Headwaters of small tributary of Nant Mawr	NW of Saron (note spring). Poss water supply	1
SJ 030 616	Small tributary of Nant Mawr		2
SJ 033 629	2 small tributaries	Springs nearby	3
SJ 028 637	Tributary		4
SJ 023 642	Afon Ystrad	Small flood plain	5
SJ 017 659	Small tributary of watercourse below		6
SJ 018 660	Watercourse	Small flood plain. Flows through Henllan	7
SJ 018 678	Watercourse	Small flood plain. Flows through Henllan	8

NGR	Watercourse	Comment	Ref on Fig 9.1
SJ 013 687	Watercourse	Small flood plain. Flows through Henllan	9
SJ 014 690	Small tributary		10
SJ 014 692	Small tributary		11
SJ 005 702	Small tributary	Well marked adjacent to stream	12
SJ 004 704	Small tributary		13
SJ 002 709	Spring	On route line – could be water supply	14
SH 998 714	Small tributary		15
SH 007 722	Afon Elwy	Large flood plain	16

Note: Main rivers identified by NRW are shown in **Bold**

- 9.5.3 Main rivers identified by NRW are shown in bold in Table 9.8 above. The Afon Elwy flows broadly west-east along a tight and well wooded river gorge in the north of the Study Area, and is joined by the Afon Ystrad north of Henllan. The tributaries of the Clwyd, Elwy and Ystrad have also generally formed locally steep and wooded river valleys that transect the area, however these are of smaller scale than the Elwy valley.
- 9.5.4 The current ecological status of the main rivers shown in bold in Table 9.8 are indicated in

Table 9.9. The assessment by NRW identifies those water bodies that are at risk of not achieving the environmental objectives set out in the Water Framework Directive. Where watercourses have not been assessed for their current ecological status it has therefore been assumed that they reach a standard of “Good” ecological quality.

Table 9.9: Current Ecological Status for Main Rivers Crossed by the Proposed Development

Watercourse	NGR of Crossing Point	Current Ecological Status	Sensitivity/Importance
Afon Ystrad	SJ 023 642	Moderate	Medium
Watercourse	SJ 018 660	Not assessed	High
Watercourse	SJ 018 678	Not assessed	High
Watercourse	SJ 013 687	Not assessed	High
Afon Elwy	SH 007 722	Good	High

9.5.5 The baseline flood risk in the Study Area is defined in the FCA (DCO Document Ref 5.3). Summary information on existing flood plains crossed by the route, as mapped by NRW, is provided in Table 9.10. There are numerous properties within the 0.1% floodplain in St Asaph, downstream of the Afon Elwy crossing point, which is therefore regarded as having a Very High importance. There are a very small number of properties within the 0.1% floodplain between the Afon Ystrad crossing point and the confluence of the Ystrad with the Elwy, a distance of approximately 7.5km, so this is considered as having Medium importance. The remaining floodplain crossings shown in Table 9.10 below have no properties within the 0.1% floodplain downstream of the crossing point and therefore have Low importance.

Table 9.10: Summary of Baseline Flood Risk Areas

Watercourse	NGR	Width across flood plain at crossing point and pole positions	Sensitivity/Importance
Afon Ystrad	SJ 023 642	35 metres.	Medium
Watercourse	SJ 018 660	<10 metres	Low
Watercourse	SJ 018 678	<10 metres	Low
Watercourse	SJ 013 687	<10 metres	Low
Afon Elwy	SH 007 722	102 metres.	Very High

9.5.6 There are no groundwater protection zones or drinking water safeguard zones and no public water abstraction points within the Study Area. There are, however, numerous private water supplies and agricultural water uses along the length of the route.

- 9.5.7 There is a high productivity aquifer underlying the Proposed Development north east of the Afon Elwy valley which is considered to be of High importance. Low productivity aquifers underlie the remaining route of the 132 kV Overhead Line to the south though there are some superficial aquifers that may be locally used within the Study Area and are therefore considered to be of Medium importance.

9.6 Embedded Mitigation

- 9.6.1 The Proposed Development has evolved taking into consideration minimising effects on water quality and flood risk as part of the design and consultation process and so several features are embedded in the design to minimise impacts. The route of the Proposed Development has ensured that the 12 kV Overhead Line is positioned away from flood plains where possible, to minimise flood risk.
- 9.6.2 Some crossing of rivers will be inevitable and where this has to occur the shortest route possible has been chosen rather than running obliquely across along river valleys. This has allowed all rivers, with the exception of the Afon Elwy, to be crossed without any supporting poles being within a recognized flood plain. In the exception, the River Elwy floodplain is too wide to cross without intermediate support but only one pole has been located within the floodplain, and that sited as far from the main river as possible.
- 9.6.3 The selection of wooden poles minimises the effects on groundwater and water quality as they which require a less substantial foundation than larger steel towers and the use of concrete is minimised. This will reduce the need for excavation and importation of materials, and reduce the risk of cementitious materials close to small watercourses. .
- 9.6.4 These measures will minimise effects of water quality and flood risk during the construction, decommissioning and operational phases of the project.
- 9.6.5 In addition to these embedded mitigation measures, there will also be standard mitigation provided by the adoption of good environmental practice, and this is described in the following section.

9.7 Assessment of Effects

Construction

- 9.7.1 Potential effects during the construction phase will be minimised by good environmental practice at the construction sites as detailed in the Design and Construction Report (DCO Document Ref 7.1), and specifically in Appendix 2.1 of this ES, which is the Construction Environmental Management Plan (CEMP). The Design and Construction Report states: "*The Project will be constructed in an environmentally sensitive manner and in particular will meet the requirements of all relevant legislation, codes of practice and standards as identified in the Environmental Impact Assessment*". SP Manweb is committed to ensuring that the Proposed Development is built in accordance with current best practice for minimising the adverse effects of construction on the environment and the local community.

- 9.7.2 Access for construction is anticipated to utilise existing road access where practicable, and will include the use of temporary trackways, comprising metal plates or stone of approximately 3-4 m width to individual sites, to minimise soil erosion and wash off into watercourses.
- 9.7.3 The poles will be fitted with wooden foundation blocks and are buried 2.5m in the ground. This minimises the need for excavation and typically an excavation 2.5m deep by 4m long and 2m wide will be necessary to accommodate the pole foundation. In areas with poor ground conditions the excavations for the foundations necessary to accommodate the baulks could be up to about 3m deep by 7m long and 3.5m wide and in very poor conditions additional measures such as a concrete or screw anchor pile foundations may be required.
- 9.7.4 Each pole should be excavated, installed and backfilled within one working day, minimising the time that excavated material is exposed. Where larger excavations area required to accommodate poor ground conditions the excess material will be removed from the site and replaced with granular material.
- 9.7.5 The poles will be pre-treated off site and will not require additional treatment during their lifetime
- 9.7.6 Temporary storage areas will be required for the dispersal of plant and equipment. In identifying temporary storage areas care is undertaken to minimise disruption to local traffic and to ensure potential environmental effects are fully mitigated. This will involve preparing the area in advance of deliveries and will include ground protection if the temporary bulk storage of poles is also planned (generally the protection will consist of a layer of polythene topped with an absorbent material such as sand which is used to soak up any leach of proprietary timber pole protection). In addition all sites are equipped with spillage protection. It is anticipated that only the areas identified at the Collector and St Asaph substations will be required for bulk storage of poles.
- 9.7.7 Further details of the standard mitigation during the construction phase are provided in the Design and Construction Report (DCO Document Ref 7.1) and the CEMP. These measures will ensure potential effects on the water environment are minimised during construction of the project. The assessment of effects below has assumed that these measures are adopted.
- 9.7.8 Assessment has led to the identification of potential effects on water quality during the construction phase and are listed below³:
- ground disturbance due to vehicle movements, excavation and exposure of base ground;
 - construction and removal of new site access tracks;
 - activities within the construction compound; and
 - storage of potentially damaging materials and substances

³ Potential effects on water quality from the construction of the Collector Substation and the underground cable section are included in Appendix 1.1 and 1.2 to this ES, respectively

- 9.7.9 These construction activities may have effects on water quality and water resources, principally through the release of sediment into watercourses but also through the potential release of oils and constructional chemicals including cementitious products. Inadequate storage of construction materials may also have flood risk effects if materials are lifted by flood waters and carried downstream as identified in the FCA.
- 9.7.10 Effects on water quality will be minimised by adoption of Design and Construction Report methodology and measures in the CEMP but there remains the possibility of temporary water quality effects on receptors arising from residual elevation of concentration of suspended solids in wet weather. As these will be temporary, and will occur when suspended solids are raised naturally the impact is considered to be of Low magnitude.
- 9.7.11 Effects on groundwater may occur if excavations penetrate into an aquifer. However, the majority proposed excavations are within overlying soil and will not disturb underlying strata. 30 of the 218 pole positions will be in areas with shallow rock, and there is a possibility that some of these may contain groundwater. The Design and Construction Report details that at these locations the rock will be broken out and replaced with imported granular fill. This material will allow passage of groundwater should it exist, and thus not interrupt groundwater flow. The volume of excavation is in any case small and unlikely to affect groundwater thus the potential effects of construction on groundwater are considered to be **Negligible**.
- 9.7.12 Potential effects on flood risk may arise from construction of temporary bridges for access tracks and from storage of materials, which may become mobilised during a flood and cause blockages of bridges and culverts downstream. Further details of flood risk are provided in the Flood Consequence Assessment (DCO Document Ref 5.3).
- 9.7.13 The access tracks are not in any recognised flood plains, so these effects, should they occur, will be limited to small watercourses and surface water runoff. Any impacts therefore will be very local and temporary in nature. Careful design of access routes and any required bridging of ditches and small watercourses will minimise this flood risk. The likelihood of this occurring and then affecting third party interests are considered very low.
- 9.7.14 Temporarily stored materials may become mobilised by flood water if storage areas are sited close to watercourses or surface water flow paths, and pose a flood risk downstream. The temporary storage areas that have been identified for the Project, at Clocaenog and St Asaph substations, are sited away from these sources of flood risk and are unlikely to cause any increase in flood risk.
- 9.7.15 Potential flood risk effects are therefore considered to be **Negligible**.

Operation

- 9.7.16 During the operation of the Proposed Development there is unlikely to be any effect on water quality as only occasional access is required along the overhead line. This will not generate significant erosion or pose a pollution hazard. No treatment of the poles or equipment is envisaged, so there will be no use of chemicals or potentially polluting substances along the route during the operational phase. The impact on water quality and water resources will therefore be **Negligible** during the operational phase.
- 9.7.17 Potential effects on flood risk during the operational phase would arise from the route points crossing the identified floodplains. The FCA identified one pole that will be sited within the floodplain of the Afon Elwy and which could give rise to a small potential increase in flood risk downstream if an extreme flood event caused it to be swept away. This possible flood risk effect was confined to an area upstream of a weir and the Bont-newydd road bridge and there are no properties at risk in either location.
- 9.7.18 There will be no increase in flood risk from the Proposed Development once access tracks have been restored, and no increase in runoff from the Collector Substation compound as drainage will be to a soakaway.
- 9.7.19 The operational effects on flood risk are therefore considered to be **Negligible**.

Decommissioning

- 9.7.20 Decommissioning will essentially be a reverse of construction, with a requirement for the same access tracks and storage areas to be re-used. After removal of the conductors the poles will be cut to the ground and the foundation blocks removed and, where used, imported infill material replaced with soil similar to that existing on site.
- 9.7.21 During decommissioning the principle potential impact on the water environment will be from disturbance of the ground, which could release sediment into watercourses. The measures required to control sediment release used in construction will be re-instated to prevent sediment reaching watercourses from both access roads and the removal of pole foundation blocks as described in the Design and Construction Report.
- 9.7.22 Storage areas for decommissioned material may also have to be re-instated, with protection against sediment runoff installed as with construction.
- 9.7.23 The effects of decommissioning on water quality are therefore similar to those of construction and thus of **Low Magnitude**.
- 9.7.24 It is considered that there are no impacts on groundwater arising from decommissioning. The effects of decommissioning on groundwater are therefore **Negligible**.
- 9.7.25 As with the construction phase, the effects on flood risk are expected to be **Negligible**.

Significance of Effects

- 9.7.26 The sensitivity of the water quality, resources and flood risk attributes in the Study Area and magnitude of the effects identified above are summarised in Table 9.11. These sensitivities and magnitudes have then been assessed using the matrix in Table 9.7 to determine their significance, which is also shown in Table 9.11.
- 9.7.27 Table 9.11 below shows that, after the embedded mitigation and the standard mitigation arising from good practice in the Design and Construction Report, all identified effects in the Study Area are considered to be of Negligible significance.

Table 9.11: Significance of Effects Following Embedded and Standard Mitigation

Attribute	Sensitivity	Magnitude of Effect: Construction and Decommissioning	Magnitude of Effect: Operation	Significance: Construction and Decommissioning	Significance: Operation
Afon Elwy: water quality	High	Low	Negligible	Minor	Negligible
Afon Elwy: flood risk	Very High	Negligible	Negligible	Negligible	Negligible
Afon Ystrad: water quality	Medium	Low	Negligible	Minor	Negligible
Afon Ystrad: flood risk	Medium	Negligible	Negligible	Minor	Negligible
Other watercourses: water quality	High	Low	Negligible	Minor	Negligible
Other watercourses: flood risk	Low	Negligible	Negligible	Minor	Negligible
Water resources: NW of Elwy Valley	High	Low	Negligible	Minor	Negligible

Attribute	Sensitivity	Magnitude of Effect: Construction and Decommissioning	Magnitude of Effect: Operation	Significance: Construction and Decommissioning	Significance: Operation
Water resources: SE of Elwy Valley	Medium	Low	Negligible	Minor	Negligible
Groundwater		Negligible	Negligible	Negligible	Negligible

9.8 Specific Mitigation Measures

- 9.8.1 As shown in Table 9.11 all identified effects on water quality, resources and flood risk have a negligible significance after the embedded and the standard mitigation documented in the Design and Construction Report and the CEMP is applied. There is therefore no need for further specific mitigation to protect these attributes.

9.9 Assessment of Cumulative Effects

- 9.9.1 The assessment of cumulative effects has been undertaken in two stages. Firstly the Proposed Development has been assessed with the Wider Scheme and two of the Wind Farms (Clocaenog and Brenig), the Stage 1 cumulative assessment (see Chapter 4 'EIA Methodology'). Stage 2 has considered the cumulative effects of the Proposed Development, the Wider Scheme and the two Wind farms with other identified developments in the vicinity such as the Burbo Bank Extension and a number of proposed single turbines for example (see Chapter 4 'EIA Methodology').

Stage 1

- 9.9.2 The Collector Substation is outside of any recognised floodplain and will be drained to soakaway. During the operational phase there will thus not be any implications for water quality or flood risk. During construction, management of runoff from the Collector Substation will be required. Measures detailed in the Design and Construction Report (DCO Document Ref 7.1), the CEMP (Appendix 2.1 (DCO Document Ref 6.18) and the Construction Environmental Management Plan, specific to the Collector Substation (Appendix 1.1 (DCO Document Ref 6.17), will ensure there is no discharge of suspended sediment from the construction site or rapid runoff from exposed soil.
- 9.9.3 The Collector Substation is in the catchment of a small tributary of the River Clywedog, which eventually flows into the River Clywd. Water from catchments crossed by the Proposed Development flows into separate tributaries, although they will all ultimately reach the River Clywd. Any cumulative effects on runoff arising from the Collector Substation will thus be further reduced, as they will be greatly diluted by the large catchment area in the River Clywd.
- 9.9.4 The underground cable from St Asaph Substation to the Terminal Point will not have any operational effects on surface water quality or flood risk, due to it being underground. There is a possibility that there will be a local effect on groundwater, but since no effects are expected from the Proposed Development there should be no cumulative effect arising from such a local effect on groundwater. During construction of the underground cable sediment from the works and if any potential dewatering/pumping of open trenches for example will be controlled to prevent surface water pollution. Measures proposed in the CEMP (Appendix 2.1, DCO Document Ref 6.17) will be equally applied to the construction of the underground cable. Any effects will therefore be local in extent and there should be no cumulative effect.
- 9.9.5 As the works proposed are within the curtilage of the existing substation, with its existing site drainage, it is considered that no effects are likely to arise.

9.9.6 As the other temporary works that form part of the Wider Scheme will be subject to the embedded mitigation measures within the CEMP (see Appendix 2.1, DCO Document Ref 6.17) no cumulative effects are likely to arise.

9.9.7 In terms of the Wider Scheme, and the two Wind Farms, therefore, it is considered that no cumulative effects will arise

Stage 2

9.9.8 Other identified developments in the vicinity are not in any of the catchments crossed by the Proposed Development, the Wider Scheme or the two Wind Farms. Any effects arising on surface waters in relation to other development within the vicinity will not interact in any way with those identified in relation to the Proposed Development, the Wider Scheme and the two Wind Farms. Similarly, there are no groundwater bodies which are effected by the Proposed Development, the Wider Scheme, the two Wind Farms and other identified developments, so no cumulative effects are anticipated.

9.10 Summary of Residual Effects

9.10.1 As identified in Table 9.11 all identified effects on water quality, resources and flood risk have a negligible significance after the embedded and the standard mitigation documented in the Design and Construction Report (DCO Document Ref 7.1) and the CEMP (Appendix 2.1) is applied. It is therefore not anticipated that there will be any residual environmental effects.