

SP MANWEB

Reinforcement to the North Shropshire Electricity Distribution Network



Document Reference: 6.9.2

Environmental Statement Appendix 9.2

Flood Risk, Water Quality and Water Resources Baseline and Assessment

PINS Reference: EN020021

Regulation Reference: 5(2)(a)

November 2018

SP MANWEB

**Reinforcement to the North Shropshire
Electricity Distribution Network**

APPENDIX 9.2

**FLOOD RISK, WATER QUALITY AND WATER
RESOURCES**

BASELINE AND ASSESSMENT

Environmental Statement

DCO Document 6.9.2

November 2018

PINS Reference EN020021

This page is intentionally blank

The Planning Act 2008

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

Regulation 5(2)(a)

Reinforcement to the North Shropshire Electricity Distribution Network

Environmental Statement: Appendix 9.2 – Flood Risk, Water Quality and Water Resources Baseline and Assessment

Document Reference No.	6.9.2
Regulation No.	Regulation (5)(2)(a)
Author	Bob Sargent, Consulting Hydrologist
Date	09 November 2018
Version	V1
Planning Inspectorate Reference No.	EN020021

SP Manweb plc, Registered Office: 3 Prenton Way, Prenton, CH43 3ET. Registered in England No. 02366937

This page is intentionally blank

APPENDIX 9.2:

FLOOD RISK, WATER QUALITY AND WATER RESOURCES BASELINE AND ASSESSMENT

1.1 INTRODUCTION

1.1.1 This section describes the hydrology baseline and assesses the effects on hydrological attributes.

1.2 BASELINE ENVIRONMENT

Hydrology of the Study Area

1.2.1 The Proposed Development comprises a new 132kV electrical circuit between Oswestry and Wem Substations in North Shropshire, together with associated temporary construction works. The circuit would be a combination of underground cables and overhead line.

1.2.2 The route of the Proposed Development and its components are shown in Figure 1.1 Location Plan (**DCO Document 6.14**).

1.2.3 The topography of the area is typical of the Shropshire Plain, being low lying and relatively flat or gently undulating. There are some areas of higher ground (between 110 – 120mAOD) in the north-west close to Oswestry.

1.2.4 The bedrock geology of the route is entirely sedimentary with deposits which vary from highly permeable in the west to low permeability in the east. The western part of the route, approximately to pole 77, is on sandstone bedrock designated as a principle aquifer. The Environment Agency proposes to develop this area as part of the Shropshire Groundwater Scheme and the route will also cross a source protection zone (zone 3 – total catchment) within this area.

1.2.5 From pole 77 eastwards the route will be on Secondary aquifers within mudstones and evaporites. Though not of national importance these aquifers may support local water sources.

- 1.2.6 Superficial drift deposits generally protect these bedrock aquifers from activity on the surface and the construction of the proposed overhead line should not impact on them.
- 1.2.7 The superficial deposits vary greatly in permeability along the route but some do themselves contain groundwater and this may, due to its superficial nature, be vulnerable to pollution from surface activities.
- 1.2.8 The Environment Agency have provided a helpful summary of the vulnerability of superficial aquifers along the route, and this is reproduced in Table 9.2.1 below.

Table A9.2.1 – Superficial Groundwater Vulnerability	
Pole Number	Environment Agency Groundwater Vulnerability Superficial Deposits
1 - 31	Low vulnerability, secondary superficial aquifer
31 - 39	High vulnerability, secondary superficial aquifer
39 - 59	Medium vulnerability, secondary superficial aquifer
59 - 76	High vulnerability, secondary superficial aquifer
76 - 102	Medium vulnerability, secondary superficial aquifer
102 - 143	High vulnerability, secondary superficial aquifer
143 - 176	Medium vulnerability, secondary superficial aquifer

- 1.2.9 Areas of medium or high groundwater vulnerability will be recognized in the draft Construction Environmental Management Plan (**DCO Document 6.3.2**) to ensure appropriate action is taken to protect groundwater in these areas.
- 1.2.10 The area lies entirely within the Severn surface water catchment and features many small watercourses and drainage channels, particularly in the west of the Preferred Line Route. There are no large rivers, and each of the watercourses crossed by the proposed development will be simply spanned without requiring support within watercourse channels. The new overhead

line would cross two watercourses recognised by the Environment Agency as main rivers, the Rivers Perry and Roden and a drainage channel which flows alongside the Roden across low lying land and then flows separately to the north of the Roden, and joins it on the outskirts of Wem.

1.2.11 All other watercourses crossed by the Proposed Development are classed as ordinary watercourses.

1.2.12 The proposed new overhead line would also cross the Montgomery Canal.

Flood Risk Areas

1.2.13 Areas of fluvial flood risk associated with both main rivers with a catchment area greater than 3km² have been identified by the Environment Agency. These areas are defined and mapped as three flood zones for the purposes of planning by the Environment Agency, as follows:

- Flood Zone 1 where the annual fluvial flood risk is less than 0.1% (i.e. less than 0.1% risk of fluvial flooding occurring in any one year);
- Flood Zone 2 where the annual risk is between 1% and 0.1%; and
- Flood Zone 3 where the annual flood risk is considered greater than 1%.

1.2.14 Both of the main rivers crossed are associated with land in Flood Zone 3, i.e. land with an annual flood risk of greater than 1% and Flood Zone 2, with an annual flood risk of between 0.1% and 1%. The defined flood risks are for the current climate and are likely to increase with the effects of climate change in the future. For the purposes of assessment, Flood Zone 2 will be taken as an indication of the worst case estimate of the extent of Flood Zone 1 during the lifetime of the Proposed Development.

1.2.15 Small watercourses with catchment areas less than 3 km² and other non-main watercourses are affected more by local rainfall-generated runoff rather than flow from large upstream catchments. Possible flood extents for these have

therefore identified using mapping of surface water flood risk, which also includes areas with no defined channel. This is flooding which results from intense rainfall where water cannot be adequately absorbed by the land surface and surface ponding or overland flow results. Mapping showing the possible flood depth and velocity of flow for “low risk” events, with an annual probability up to 0.1% has been used to assess these remaining flood risk areas.

- 1.2.16 Although the 0.1% annual flood risk areas are extensive in low lying agricultural areas in the Study Area there are no significant numbers of residential properties at risk of flooding either from rivers, surface water or other sources identified in the Flood Risk Assessment (**DCO Document 5.2**).

Water Quality

- 1.2.17 Published water quality information is available for the watercourses in the Study Area from the Environment Agency which has classified the chemical and ecological status of each river reach to assess compliance with the Water Framework Directive.
- 1.2.18 The River Roden was classified in 2016 as ecologically Poor but Good chemically, with the objective to achieve Good status for both measures by 2027.
- 1.2.19 The River Perry was classified in 2016 as ecologically Moderate but Good chemically, with the objective to achieve Good status for both measures by 2027
- 1.2.20 It has therefore been assumed that all watercourses in the study area have the ability to achieve Good ecological condition and are able to sustain coarse fisheries.

Water Resources

- 1.2.21 Groundwater resources are significant within bedrock in the area, although substantial areas of less permeable superficial deposits exist in many areas

which offer protection to the groundwater.

- 1.2.22 The most significant groundwater resource is the Shropshire Groundwater Scheme in the western part of the Study Area. There are also licensed abstractions of surface and groundwater in the River Perry and the River Roden catchments for agricultural purposes, principally for spray irrigation. There are no licensed private water supplies in the Study Area.
- 1.2.23 The Proposed Development passes through a total catchment (zone 3) groundwater source protection zone associated with a public water supply at Woodhouse. This is the area around a source within which all groundwater recharge is presumed to be discharged at the source. The groundwater abstraction is used for potable supply by Severn Trent Water Ltd.
- 1.2.24 It is likely that further exploitation of groundwater in the area will occur in the future and phase 7 of the Shropshire Groundwater Scheme is expected to require the construction and maintenance of groundwater wells in the western part of the Study Area.
- 1.2.25 There are also licensed abstractions of surface and groundwater in the River Perry and the River Roden catchments for agricultural purposes, principally for spray irrigation.

Sensitivity/Importance of Receptors

- 1.2.26 The sensitivity or importance of the receptors identified in the baseline have been assessed using the methodology in Table A9.1.1 in Appendix 9.1 (**DCO Document 6.9.1**). These are summarized in Table A9.2.2 below.

Table A9.2.2 – Sensitivity/Importance of Hydrological receptors	
Receptor	Sensitivity/Importance
Water Quality	High (Good Ecological Quality)
Water Resources	Very High (Major aquifer providing a regionally important groundwater resource)

Table A9.2.2 – Sensitivity/Importance of Hydrological receptors	
Receptor	Sensitivity/Importance
Flood Risk	Low (Flood plain with limited constraints and low probability of flooding of residential and industrial properties)

1.3 IDENTIFICATION OF POTENTIAL EFFECTS

1.3.1 This section presents an assessment of significant potential hydrological effects, based on the Proposed Development as described in Chapter 3 ‘The Proposed Development’ (**DCO Document 6.3**). It describes the likely impacts and potential significant effects that may arise during construction and operation on surface water and groundwater receptors.

Effects during Construction

1.3.2 Possible effects of construction work are:

- Increased flood risk due to location of temporary laydown areas, access tracks and temporary construction activities within the floodplain;
- Release of sediment into surface water during construction activities;
- Accidental release of oils, fuels and construction materials, including accidental release of contaminants into the groundwater, particularly from temporary laydown areas; and
- Trenching activities for the underground sections.

1.3.3 Effects during the construction period have been reduced by:

- Careful siting of access tracks and temporary laydown areas;
- Adoption of a Construction and Environmental Management Plan (CEMP)¹ which will include best practice guidance for pollution prevention, a drainage management plan, and a watercourse crossing

¹ The draft CEMP is DCO Document 6.3.2

plan; and

- No works being undertaken within 8m of main rivers (i.e. the Rivers Roden and Perry).

- 1.3.4 As noted in Chapter 3, 'The Proposed Development' (**DCO Document 6.3**) the construction compound will be sited at the existing SP Energy Networks depot at Maesbury Road on the Oswestry Industrial Estate which already serves as a construction compound for other SP Manweb works and therefore it is not included within the DCO. This will minimize the risk of contaminants being released to surface and groundwater within the study area since the temporary trenching works, laydown areas, temporary works and the pole erection sites will be the only potential sources.
- 1.3.5 The construction effects at these locations would be temporary and managed through the CEMP (**DCO Document 6.3.2**), as identified in Chapter 3 'The Proposed Development' (**DCO Document 6.3**) of the Environmental Statement, which will minimise the release of sediment and other contaminants to ensure watercourses are not contaminated during the construction phase.
- 1.3.6 Detailed effects during the construction period on flood risk have been identified and assessed within the Flood Risk Assessment (**DCO Document 5.2**).
- 1.3.7 There are no temporary laydown areas proposed within flood zone 3. One laydown area, at Brookfield Farm, includes a small area with to an estimated surface water flood risk area annual probability of 1% but is not within the 0.1% annual probability zone.
- 1.3.8 The temporary access tracks will have to cross areas in flood zone 3. As discussed in the Flood Risk Assessment (**DCO Document 5.2**), the access tracks will not be elevated above the ground level and will not require the use of culverts or bridges.
- 1.3.9 Any construction activity on or near the flood defences associated with the

River Roden would also be controlled via an Environment Agency permit. .

1.3.10 Adherence to good working practices will result in there being no significant adverse effects on flood risk, water quality and resources during the construction phase of the Proposed Development. After the above mitigation has been adopted the magnitude of the potential construction effects is shown in Table A9.2.3 below

Table A9.2.3 – Magnitude of Potential Effects During Construction	
Effect	Nature or Magnitude (after identified mitigation)
Water Quality	Negligible (insufficient magnitude to affect the use or integrity)
Water Resources	Negligible (insufficient magnitude to affect the use or integrity)
Flood Risk	Negligible (insufficient magnitude to affect the use or integrity)

Effects during Operation

1.3.11 Only the poles will remain within the study area during the operational phase. The likely significant effects on surface water and groundwater receptors during operation are:

- Effects on flood risk as a result of poles sited within the flood plain, which may collect debris or deflect flood flows;
- Runoff from the Proposed Development which could increase flood risks elsewhere; and
- Assessment of potential effects on water resources during the operational phase has been scoped out of the assessment.

1.3.12 Detailed effects during the operational period of the Proposed Development on flood risk have been identified and assessed within the Flood Risk Assessment (**DCO Document 5.2**). It includes an assessment of all sources of flooding and the potential changes due to climate change.

1.3.13 Table A9.2.4 below summarises areas where the Proposed Development crosses areas of identified fluvial flood risk, as identified in the FRA.

Table A9.2.4 – Potential flood risk locations	
Area of flood risk	Summary description
West of Montgomery Canal	Extensive area of low relief land with drainage channel associated with River Perry. 1100 m of line within flood zone 2.
River Perry at Rednal Mill (Main river)	River crossed twice but limited flood extent.
River Perry	250 m within flood zone 2 and 200 m within flood zone 3.
Area north-east of Wackley Lodge	150 m within flood zone 2 and 118 m within flood zone 3.
Sleep Brook	160 m within flood zone 2 and 122.5 m within flood zone 3.
River Roden (Main river)	A large area of flood zone 2 associated with the River Roden and its tributary are crossed by the Proposed Development.

1.3.14 The overhead line will span all watercourses and no poles are located within watercourse channels. Some pole locations would have to be sited within wide flood plains but flood flow velocity will be minimal in the flood plains as the slopes are low. As identified in the Flood Risk Assessment (**DCO Document 5.2**) the low flood flow velocities mean debris collection and deflection of the current would be minor and the effects of the poles on flood flow route and velocity would therefore not be significant.

1.3.15 The poles will not require substantial foundations, as described in Chapter 3 ‘The Proposed Development’ (**DCO Document 6.3**), and the cross-sectional area of individual poles is insignificant. There will therefore be no discernable runoff generated from the Proposed Development.

1.3.16 The magnitude of any potential effect from the Proposed Development on flood risk is therefore considered to be negligible

1.3.17 A route has been selected, taking into account consultation feedback from the Environment Agency, which avoids possible conflict with anticipated construction and future maintenance of the Shropshire Groundwater Scheme. Possible interference with operations associated with future development of the Shropshire Groundwater Scheme has therefore been avoided.

1.3.18 Table A9.2.5 below summarises the magnitude of potential effects during the operational phase.

Table A9.2.5 – Magnitude of Potential Effects During Operation	
Effect	Nature or Magnitude (after identified mitigation)
Flood Risk	Negligible (insufficient magnitude to affect the use or integrity)

1.4 ASSESSMENT OF SIGNIFICANCE OF EFFECTS

1.4.1 Appendix 9.1 (**DCO Document 6.9.1**) provides the methodology used to assess the significance of the potential effects identified above, and this table is reproduced in Table A9.2.6 below.

Table A9.2.6: Assessing the Significance of Effect					
		Magnitude of Change			
		High	Medium	Low	Negligible
Sensitivity / Importance of	Very High	Major	Major	Moderate	Negligible
	High	Major	Moderate	Minor	Negligible
	Medium	Moderate	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible

1.4.2 The matrix in Table A9.2.6 is used to assess the significance of the potential changes shown in Tables A9.2.3 and A9.2.5 of this document, having regard to the importance or sensitivity of the receptors as identified in Table A9.2.2.

1.4.3 Table A9.2.7 shows that that all the identified potential effects during the construction phase are Negligible

Table A9.2.7 – Significance of Effects – Construction Phase			
Receptor	Sensitivity of Receptor	Magnitude of Change	Significance of Effect
Water Quality	High	Negligible	Negligible
Water Resources	Very High	Negligible	Negligible
Flood Risk	Low	Negligible	Negligible

1.4.4 Table A9.2.8 shows that that all the identified potential effects during the operational phase are Negligible.

Table A9.2.7 – Significance of Effects – Operational Phase			
Receptor	Sensitivity of Receptor	Magnitude of Change	Significance of Effect
Flood Risk	Low	Negligible	Negligible

It is concluded that there are no significant flood risk, water quality or water resources effects arising from either the construction or operation phase of the Proposed Development.