

**The Great Grid Upgrade**

Chesterfield to Willington

# Preliminary Environmental Information Report

Volume 1: Chapter 9 Hydrology and Land Drainage

March 2026

nationalgrid

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# 9. Hydrology and Land Drainage

## 9.1 Overview

9.1.1 This chapter reports the preliminary assessment of the likely significant hydrology and land drainage effects that could result from the Chesterfield to Willington Project (the 'Project') during construction and operation and describes:

- relevant legislation and policy context;
- consultation and engagement undertaken to date;
- the methodology for assessment;
- relevant baseline information;
- design, control and additional mitigation measures;
- potential effects of the construction phase;
- potential effects of the operational phase;
- monitoring requirements; and
- residual effects.

9.1.2 This chapter covers effects on the following receptors during construction and operation:

- surface water receptors (main rivers, ordinary watercourses, ditches, floodplains, canals and other surface water bodies);
- surface water abstractions/drinking water protected zones;
- flood risk receptors; and
- designated/protected sites.

9.1.3 This chapter should be read in conjunction with:

- **Chapter 4 Description of the Project.**
- **Chapter 5 Approach to Preliminary Environmental Information Report.**
- **Chapter 7 Ecology and Biodiversity.** This chapter includes elements on aquatic ecology and designated sites.
- **Chapter 10 Geology and Hydrogeology.** This chapter includes elements relating to changes to groundwater regime and quality, as well as surface water quality.
- **Chapter 11 Agriculture and Soils.** This chapter include elements relating to changes in agricultural land use, practices and soil types.
- **Chapter 12 Traffic and Transport.** This chapter include elements relating to the affected transport networks and/or those associated with adjacent land uses of the affected transport networks.
- **Chapter 17 Cumulative Effects.** This chapter outlines the intra-scheme interactions between technical topics.

9.1.4 This chapter is supported by the following figures in **Volume 2** and appendices in **Volume 3**. These include:

- **Figure 9.1 Watercourses;**
- **Figure 9.2 Water Abstractions;**
- **Appendix 9A Preliminary Flood Risk Assessment;**
- **Appendix 9B Water Framework Directive Screening Assessment;** and
- **Appendix 9C Baseline Information.**

## 9.2 Legislation, Planning Policy and Guidance Context

### Legislation

9.2.1 A summary of the legislation relevant to hydrology and land drainage is outlined below:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 9.1). The 2017 Regulations place a general duty on the Secretary of State and the Environment Agency (EA) to exercise their 'relevant functions' so as to secure compliance with the Water Framework Directive (WFD) (Regulation 3).
- Part 5 of the Environment Act 2021 (Ref 9.2). This Act introduces legally binding targets for water quality and resource management, which are considered in the identification of mitigation measures and monitoring strategies. Part 5 of the Act amends the Water Industry Act 1991 and makes provision for water resource management plans; drainage and sewerage management plans; storm overflows; regulation of water and sewage undertakers; and abstraction, water quality and land drainage. Sections 79–82, 84–89, 93, 94, 96, and 97 of Part 5 of the Environment Act 2021 which are currently in force are relevant to the Project.
- Land Drainage Act 1991 (Ref 9.3). This Act governs the responsibilities of drainage authorities and informs the assessment of impacts on existing land drainage infrastructure, particularly in agricultural areas.
- Flood and Water Management Act 2010 (Ref 9.4). In accordance with the Act the EA is responsible for the management of risks associated with main rivers, the sea and reservoirs; and the Lead Local Flood Authorities (LLFAs) are responsible for the management of risks associated with local sources of flooding such as ordinary watercourses, surface water and groundwater.
- Water Resources Act 1991 (Ref 9.5). This legislation regulates water abstraction and discharge, which is relevant to the assessment of construction-phase water use and potential impacts on water resources.
- The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (Ref 9.6). These regulations require the inclusion of hydrology and land drainage impacts in the Environmental Statement (ES), ensuring a robust and transparent assessment process.
- The Environmental Permitting (England and Wales) Regulations 2016 (Ref 9.7). These regulations govern the need for permits for activities that may affect water quality or hydromorphology, such as works near watercourses or discharges.

- The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 (Ref 9.8). In accordance with the Act, it is a legal offence to cause or knowingly permit a water discharge activity without an appropriate exemption or permit from the EA. The Environmental Permitting Regulations also assist in the management of flood risk. Any activity which has the potential to impact on a main river (which typically means any works in the vicinity of a main river, flood defence structure and sea defence, or in a floodplain) will require a Flood Risk Activities Permit (previously referred to as Flood Defence Consent) to be granted by the EA.
- Water Act 2014 (Ref 9.9). This Act supports the sustainable management of water resources and informs the consideration of long-term resilience in the face of climate change.
- Environmental Protection Act 1990 (Ref 9.10). This Act establishes provisions for preventing and controlling pollution to protect water sources, including groundwater.

## National Policy Statements

9.2.2 **Chapter 2 Legislative, Regulatory and Planning Policy Context** sets out the overarching policies relevant to the Project including the Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 9.11) and the NPS for Electricity Networks Infrastructure (EN-5) (Ref 9.12). **Table 9.1** sets out the requirements of both NPSs relevant to hydrology and land drainage and how these have been considered within this chapter.<sup>1</sup>

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<sup>1</sup> The updated NPSs came into force on 6 January 2026; however, this post-dated the drafting and assessment work within this chapter and so are not reflected within the relevant policy descriptions in this chapter, which are instead based on the 2023 versions of the NPSs that were in force at the time of preparing the Chapter. These sections will be updated in the ES as part of the Application; however, after initial review and consideration, it is not anticipated that the updates to the NPS will result in any material changes to the assessment methodology or the conclusions in this chapter.

**Table 9.1: National Policy Statements relevant to hydrology and land drainage**

Policy Reference	Policy Context	How It Will Be Considered
<b>Overarching National Policy Statement for Energy (EN-1)</b> (Ref 9.11)		
Paragraph 5.8.13	<p><i>'A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England or Zones B and C in Wales.'</i></p>	<p>This Preliminary Environmental Information Report (PEIR) includes a preliminary Flood Risk Assessment (FRA) (see <b>Appendix 9A</b>) which identifies baseline flood risk and outlines initial mitigation measures. A FRA will be prepared for the Project with agreed scope in consultation with the EA and LLFA.</p>
Paragraph 5.8.36	<p><i>'In determining an application for development consent, the Secretary of State should be satisfied that where relevant:</i></p> <ul style="list-style-type: none"> <li>• <i>The application is supported by an appropriate FRA;</i></li> <li>• <i>The Sequential Test has been applied and satisfied as part of site selection;</i></li> <li>• <i>A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;</i></li> <li>• <i>The proposal is in line with any relevant national and local flood risk management strategy;</i></li> <li>• <i>Sustainable Drainage Systems (SuDS) have been used unless there is clear evidence that their use would be inappropriate;</i></li> <li>• <i>In flood risk areas the project is designed and constructed to remain safe and operational</i></li> </ul>	<p>An FRA will be prepared for the Project, evidencing application of the Sequential Test, in accordance with the requirements of national and local flood risk policies and strategies. The Project will embed flood resilience into its design and provide flood risk mitigation measures to prevent off site flood risk impacts. A preliminary FRA, prepared as part of the PEIR and included as <b>Appendix 9A</b>, has already been developed to support early-stage assessments.</p>

Policy Reference	Policy Context	How It Will Be Considered
Paragraph 5.16.3	<p><i>during its lifetime, without increasing flood risk elsewhere;</i></p> <ul style="list-style-type: none"> <li>• <i>The project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development; and</i></li> <li>• <i>Land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance.'</i></li> </ul>	<p>The potential effects of the Project on the water environment, including on such aspects as water quality, water resources and physical characteristics, will be considered. This PEIR has screened water bodies under the WFD (see <b>Appendix 9B</b>) and identified sensitive receptors and initial mitigation strategies. The ES and FRA will include consideration of how the existing baseline could change in the future because of climate change.</p>
Paragraph 5.16.4 (of the draft update to EN-1)	<p><i>'Applicants should make early contact with the EA, NRW [Natural Resources Wales] and water companies with their proposed water requirements to understand whether water is available and if new water infrastructure is required. If insufficient water is available for</i></p>	<p>The potential effects of the Project on water resources will be considered in the ES. Consultation with relevant stakeholders including the EA, Severn Trent Water and Yorkshire Water is on-going and will continue to inform development of the Project and the assessment of effects in the ES.</p>

Policy Reference	Policy Context	How It Will Be Considered
Paragraph 5.16.9 (of the draft update to EN-1)	<i>abstraction the EA and NRW will be unable to authorise an abstraction licence.'</i>	If insufficient water is available for abstraction, as identified through consultation with relevant stakeholders, alternative sources of water will be identified as required.
Paragraph 5.16.12	<i>'If insufficient water is available for abstraction, the applicant will need to find alternative sources of water to be able to proceed, whether this is developing their own source or collaborating with the water industry or other water abstractors to develop a joint source.'</i>	If insufficient water is available for abstraction, as identified through consultation with relevant stakeholders, alternative sources of water will be identified as required.
Paragraph 5.16.12	<i>'The Secretary of State will need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.'</i>	The Project will be subject to a WFD assessment that will set out the measures that will be adopted to ensure no adverse effects on the achievement of objectives set for water bodies within the Project's zone of influence. The WFD will be prepared with agreed scope with the EA. A WFD Screening Assessment (see <b>Appendix 9B</b> ) has been undertaken to accompany this PEIR which identifies relevant water bodies and potential risks.
Paragraph 5.16.14	<i>'The specific objectives for particular river basins are set out in River Basin Management Plans. The Secretary of State must refuse development consent where a project is likely to cause deterioration of a water body or its failure to achieve good status or good potential, unless the requirements set out in Regulation 19 are met. A project may be approved in the absence of a qualifying Overriding Public Interest test only if there is sufficient certainty that it will not cause deterioration or compromise the achievement of good status or good potential.'</i>	The Project will be subject to a WFD assessment, consisting of information that will set out the measures that will be adopted to ensure no deterioration of water bodies within the Project's zone of influence. Reference will be made to the Humber River Basin Management Plan (Ref 9.13) and its specific objectives.

Policy Reference	Policy Context	How It Will Be Considered
<b>National Policy Statement for Electricity Networks (EN-5)</b> (Ref 9.12)		
Paragraph 2.3.2	<p data-bbox="479 300 1160 443"><i>‘...applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and as appropriate, how it has been designed to be resilient to:</i></p> <ul data-bbox="479 459 1160 1050" style="list-style-type: none"> <li data-bbox="479 459 1160 603">• <i>Flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;</i></li> <li data-bbox="479 619 1160 683">• <i>The effects of wind and storms on overhead lines;</i></li> <li data-bbox="479 699 1160 762">• <i>Higher average temperatures leading to increased transmission losses;</i></li> <li data-bbox="479 778 1160 890">• <i>earth movement or subsidence caused by flooding or drought (for underground cables); and</i></li> <li data-bbox="479 906 1160 1050">• <i>Coastal erosion – for the landfall of offshore transmission cables and associated substations in the inshore and coastal locations respectively.’</i></li> </ul>	<p data-bbox="1205 300 2110 523">An FRA will be prepared that assesses all applicable sources of flooding to the Project and identifies any mitigation measures required to ensure flood resilience, taking the effects of climate change into account. A preliminary FRA, prepared as part of the PEIR and included as <b>Appendix 9A</b>, has already been developed to support early-stage assessments.</p>
Paragraph 2.3.3	<p data-bbox="479 1082 1160 1337"><i>‘Section 4.10 of EN-1 advises that the resilience of the project to the effects of climate change must be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment (see Section 5.6 in EN-1).’</i></p>	<p data-bbox="1205 1082 2110 1225">Both an ES and FRA will be produced to assess the potential effects of future climate change on the baseline water environment conditions and flooding. A preliminary assessment is provided in the preliminary FRA (<b>Appendix 9A</b>).</p>

## Other National Policy

9.2.3 A summary of other relevant national policy considered in the scope of effects on hydrology and land drainage include:

- National Planning Policy Framework (NPPF) (Ref 9.14) as supported by the following Planning Practice Guidance:
  - Flood risk and coastal change last updated in 2025 (Ref 9.15); and
  - Water supply, wastewater and water quality last updated in 2019 (Ref 9.16).

## Regional and Local Policy

9.2.4 **Chapter 2 Legislative, Regulatory and Planning Policy Context** sets out relevant regional and local policy considered by this Project.

9.2.5 Relevant local policy, specific to the hydrology and land drainage includes:

- Amber Valley Borough Local Plan (Adopted 2006) (Ref 9.17) and Amber Valley Local Plan (2022-2040), currently at Local Plan Examination (Ref 9.18);
- South Derbyshire District Council Level 1 Strategic Flood Risk Assessment (SFRA) (Ref 9.19);
- Chesterfield, Bolsover and North East Derbyshire SFRA (Ref 9.20);
- Derbyshire County Council & Derby City Council Level 1 SFRA (Ref 9.21);
- Amber Valley Borough Council Level 1 SFRA (Ref 9.22);
- Local Plan for Bolsover District (Adopted 2020) (Ref 9.23);
- Chesterfield Borough Local Plan (Ref 9.24);
- Erewash Borough Council Core Strategy (Adopted 2014) (Ref 9.25);
- North East Derbyshire Local Plan 2014 – 2034 (Ref 9.26);
- South Derbyshire District Council Local Plan (Adopted 2016) (Ref 9.27);
- Derbyshire County Council Local Flood Risk Management Strategy (Ref 9.28); and
- Derbyshire’s Local Nature Recovery Strategy (Ref 9.29).

## Guidance

9.2.6 Relevant guidance, specific to hydrology and land drainage, which has informed this PEIR and will inform the assessment within the ES, includes:

- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Ref 9.30);
- Various Construction Industry Research and Information Association publications that provide construction good practice for preventing pollution of the water environment, for example:
  - C532: Control of Water Pollution from Construction Sites (Ref 9.31); and

- C688: Flood Resilience and Resistance for Critical Infrastructure (Ref 9.32).
- Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment (Ref 9.33);
- Derbyshire County Council’s Local Flood Risk Management Strategy (Ref 9.28);
- The SuDS Manual (C753F) (Ref 9.34);
- Flood Risk and Coastal Change Planning Practice Guidance (Ref 9.15);
- Construction Best Practice for Underground Cable Installation (Ref 9.35);
- Construction Best Practice for Overhead Line Installation (Ref 9.36);
- Non-Technical Standards for Sustainable Drainage Systems (Ref 9.37); and
- DMRB LA 104: Environmental Assessment and Monitoring (Ref 9.38).

## 9.3 Scoping Opinion and Consultation

### Scoping Opinion and Stakeholder Engagement

9.3.1 A Scoping Report (Ref 9.39) was prepared and submitted by National Grid to the Planning Inspectorate in October 2024. The Planning Inspectorate provided a Scoping Opinion (Ref 9.40) on behalf of the Secretary of State for Energy Security and Net Zero in December 2024. Responses from the Planning Inspectorate in relation to hydrology and land drainage and how these requirements will be addressed by the applicant are set out in **Table 9.2**.

**Table 9.2: Summary of Planning Inspectorate’s Scoping Opinion comments in relation to hydrology and land drainage**

Scoping Opinion ID	Planning Inspectorate’s Comments	Response
2.2.6	<i>‘The Applicant’s attention is drawn to the comments of the Canal and River Trust. The ES should provide justification / evidence to demonstrate that the structure of the Trent and Mersey Canal would not be impacted or include an assessment where significant effects are likely.’</i>	As outlined in <b>Table 9.13</b> of section 9.8 of the PEIR, the Project is not anticipated to impact on the structure or have significant environmental impacts on the Trent and Mersey Canal.  Engagement with the Canal and River Trust and associated restoration groups, including the Friends of the Cromford Canal and the Derby and Sandiacre Canal Trust, will continue as part of the design and pre-construction planning.
3.0.2	Table 5.9 of the EIA Scoping Report (Ref 9.39) – <i>‘The Inspectorate agrees that significant effects are not likely as a result of</i>	Flood defence failure is considered within the Preliminary Flood Risk

Scoping Opinion ID	Planning Inspectorate's Comments	Response
	<p><i>the natural disasters and manmade / technological disasters detailed in Table 5.9 of the Scoping Report, with the exception of flood defence failure... With regards to flood defence failure, the Applicant is advised to discuss the approach further with the Environment Agency, and if the measures including the proposed buffers are not agreed to be adequate to avoid the potential for effects on flood defences, then this matter should be scoped into the ES'.</i></p>	<p>Assessment (<b>Appendix 9A</b>) and will be fully considered within the ES following further consultation with the EA and other relevant stakeholders, and any mitigation measures required will be agreed with these parties and secured within the draft development consent order (DCO).</p>
3.4.1	<p>The EIA Scoping Report '<i>states that no operational discharges would be generated and surface water drainage from operational infrastructure would be managed using suitable sustainable drainage (SuDS). Subject to the provision of SuDS, the Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES'.</i></p>	<p>The effects on surface water quality during operation are scoped into the assessment at the location of the new 400 kV Chesterfield Substation due to a permanent drainage outfall proposed. Operational effects on surface water quality to receptors elsewhere in the Study Area are scoped out. Further information on the measures proposed to manage construction work site runoff and the good practice measures that will be enacted to prevent pollution of the water environment are provided in the preliminary Code of Construction Practice (CoCP) in <b>Appendix 4A</b> and will be agreed with relevant stakeholders during preparation of the ES.</p>
3.4.2	<p>The EIA Scoping Report '<i>states that there would be no new large scale consumptive water uses and no effects on the downstream continuity of flow in watercourses. Details of water supply and demand requirements during construction and operation and potential sources of supply have not been provided and the Inspectorate notes that the Environment Agency advised during the non-statutory consultation that impacts on water resources should be scoped in (Table 9.2). Therefore, the Inspectorate does not agree this matter can be scoped out at this stage. The ES should provide details of</i></p>	<p>Agreed to scope in existing water interests (abstractions and discharges) for both construction and operational phases. Engagement with the EA on this matter will continue as part of the design and pre-construction planning.</p>

Scoping Opinion ID	Planning Inspectorate's Comments	Response
	<p><i>water supply and demand requirements and an assessment of impacts on existing water interest where significant effects are likely, or confirmation of agreement with relevant consultation bodies that significant effects are not likely'.</i></p>	
3.4.3	<p><i>'Paragraph 9.7.6 of the Scoping Report considers that changes to the groundwater regime from excavations for cabling or deep foundations for the substation would be small. This is contradicted by paragraph 10.7.13 which states that ground disturbance has the potential to result in changes to groundwater flow regimes. The Inspectorate also notes the Environment Agency's concerns that the substation foundations would be permanent, therefore any changes to the groundwater regime may extend beyond the construction phase; and that there are numerous groundwater abstractions near to the Willington substation which could be affected by this construction work. As such, the Inspectorate does not agree this matter can be scoped out.</i></p> <p><i>Impacts on the groundwater regime during operation are not addressed. For the avoidance of doubt, the Inspectorate considers the operational phase should also be assessed within the ES, as proposed in paragraphs 10.7.16 and 10.7.17 of the Scoping Report.</i></p> <p><i>The Inspectorate is content for an assessment to be presented in a single place within the ES with appropriate cross references to minimise duplication'.</i></p>	<p>Changes to and impacts upon the groundwater regime during construction and operation are addressed within <b>Chapter 10 Geology and Hydrogeology</b>.</p>
3.4.4	<p><i>'The Scoping Report states that once the Proposed Development is installed and land temporarily affected is re-instated, there would be no disturbance to the beds, banks, flow regimes or riparian corridors of watercourses. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES'.</i></p>	<p>Since the progression of the WFD Screening Assessment, there is a potential hydromorphological impact regarding infrastructure located within the erodible corridor of watercourses, therefore preventing the delivery of WFD mitigation. This has therefore been screened in for assessment (See <b>Appendix 9B</b>).</p>

Scoping Opinion ID	Planning Inspectorate's Comments	Response
3.4.5	<p><i>'Table 9.5 [of the Scoping Report proposes to scope out flood risk from other sources (the sea, sewers, artificial waterbodies)] due to the nature of the Proposed Development (overhead line and buried cable) making it of low vulnerability to flooding from other sources and as it has limited potential to impact on flood risk from these sources. However, paragraph 9.7.14 [of the Scoping Report] states that these potential sources of flooding would be reviewed as part of a Flood Risk Screening Assessment. In addition, paragraph 9.5.13 [of the Scoping Report] notes that parts of the site are at risk of reservoir flooding and no consideration has been given to flooding at the substation. The Inspectorate therefore considers it premature to scope this matter out. The ES should assess significant effects from all sources of flood risk, where significant effects are likely, or provide evidence of agreement with relevant consultation bodies that significant effects are not likely'.</i></p>	<p>Agreed. All sources of flood risk, during both construction and operation have been scoped in and are assessed within the preliminary FRA (<b>Appendix 9A</b>), which supports the PEIR. This replaces the previously proposed Flood Risk Screening Assessment.</p>
3.4.6	<p><i>'The Environment Agency has advised that the "geology along the route is highly variable, including locations with a Principal bedrock aquifer and no superficial deposits. Groundwater flooding can occur in superficial and bedrock aquifers and the Applicant should note that aquifer designation is not a direct indicator of likelihood of groundwater flooding."</i></p> <p><i>The Applicant is advised to further assess the likely groundwater regime to determine the risk of groundwater flooding and seek agreement with the Environment Agency on the need to assess groundwater flooding within the ES'.</i></p>	<p>Agreed to scope in groundwater flooding. Further discussions will be held with the EA on the need to assess groundwater flooding. This will be informed by data provided in <b>Chapter 10 Geology and Hydrogeology</b>. The assessment of groundwater flooding will be within the FRA submitted with the ES.</p>
3.4.7	<p><i>'Paragraph 9.8.5 [of the Scoping Report] states that significance would be derived using the matrix set out in Chapter 5. However, the sensitivity and magnitude criterion used in Table 9.3 and Table 9.4 respectively do not accord with those presented in Table 5.3. The Applicant should ensure consistency in its approach or provide clear explanations where aspect specific</i></p>	<p>Consistency will be maintained with the approach outlined in <b>Chapter 5 Approach to Preliminary Environmental Information Report</b>.</p>

Scoping Opinion ID	Planning Inspectorate's Comments	Response
	<i>approaches depart from the overarching methodology'.</i>	
3.4.8	<i>'The potential for effects on ground water quality from disturbance and mobilisation of existing contamination, including from historic and existing landfills, should be assessed in the ES, where significant effects are likely'.</i>	Effects upon groundwater quality are addressed within <b>Chapter 10 Geology and Hydrogeology</b> .
3.4.9	<i>'The ES should assess impacts from any use of [Horizontal Directional Drilling] HDD on water resource receptors where significant effects are likely. Should drilling fluid be used in construction, a breakout plan should be submitted with and secured within the DCO application'.</i>	If required, this element will be addressed within the ES.
3.6.5	<i>'The ES should include an assessment of any likely significant effects on retained existing agricultural drainage or the removal of this from the construction and operation of the Proposed Development'.</i>	Section 9.6 of this chapter includes a control measure to ensure that the potential impact to existing agricultural drainage is negligible. The impact to surface water flood risk as a result of changes to local hydrology is assessed in section 9.8.
9.3.2	<b>Table 9.3</b> provides a summary of the consultation feedback from specific stakeholders provided as part of the Scoping Opinion to inform the hydrology and land drainage assessment to date.	

**Table 9.3: Summary of stakeholder Scoping Opinion responses in relation to hydrology and land drainage**

Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
Holbrook Parish Council	<i>'The concern of [Holbrook Parish Council] is that any land disturbance could lead to [toxic material associated with the Cinderhill Tarpits] finding its way into the Bottle Brook and beyond'.</i> <i>'In recent years there has been an increased frequency of flash flooding from the Bottle Brook which could transfer toxic materials disturbed in the area.'</i>	The risk of flooding from the Bottle Brook will be assessed in accordance with the existing hydraulic model provided by the EA ( <b>Appendix 9A Preliminary Flood Risk Assessment</b> ). Section 9.6 includes control measures which reduce the potential impact to water quality as a result of the Project to negligible. The impact to surface water flood risk as a result of

Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
		changes to local hydrology is assessed in section 9.8.
Draycott and Church Wilne Parish Council	<p><i>'Landowners and leasers should be consulted on any work which requires either access through or construction on their land. Grazing and agricultural land will be unusable or restricted during construction and the quality of the land under the pylon or which was traversed by large machinery during construction will likely be adversely affected in terms of its future fertility. It is also entirely possible that hedgerows and drainage courses in this flood plain could be adversely affected'.</i></p>	<p>The impact to watercourses (drainage courses) during the construction phase of the Project will be assessed in the ES submitted with the DCO application. This PEIR identifies a residual effect which is not significant to watercourses during the construction phase due to control measures which are set out in section 9.6. Matters raised concerning agricultural land are addressed in <b>Chapter 11 Agriculture and Soils</b> and arboriculture impacts are addressed in <b>Chapter 7 Ecology and Biodiversity</b>.</p>
Ockbrook and Borrowwash Parish	<p><i>'In the specific case of Ockbrook and Borrowwash Parish, we would also like to highlight several locally significant environmental characteristics that we would like to see included in the ES assessment:</i></p> <ul style="list-style-type: none"> <li><i>• Construction pollution of the Ock Brook as the proposed graduated swathe of [the Project] is through the catchment of this watercourse.</i></li> <li><i>• Flood risk to the Ock Brook catchment as the area already suffers significantly from this issue, and construction and operation compaction of the land would only increase this.'</i></li> </ul>	<p>Section 9.6 includes control measures which reduce the potential impact to water quality to negligible.</p> <p>It is agreed to scope in all sources of flood risk – construction and operation within the preliminary FRA (<b>Appendix 9A Preliminary Flood Risk Assessment</b>). Flood risk to the Ockbrook area that falls within the Study Area will be assessed in detail in the ES using the available EA datasets and hydraulic modelling data. Proportionate mitigation measures will be proposed to mitigate against any potential increased impacts as a result of the Project.</p>
Canal and River Trust	<p><i>'We note that the report states that the ES will be informed by consultation and engagement with stakeholders, including the Canal and River Trust (para. 9.5.2 [of the Scoping Report]), and we consider that this engagement will be essential to ensure that the potential impacts</i></p>	<p>The request for further consultation is acknowledged. The Project will seek to follow the Canal and River Trust's Code of Practice for third party works as far as reasonably practicable.</p>

Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
	<p><i>on the canal can be identified and addressed as the scheme is further developed. The Trent and Mersey Canal is correctly identified in the list of watercourses potentially affected by the proposal set out in para. 9.5.5 [of the Scoping Report]. At this stage it is difficult to comment in any detail as the proximity of the final route of the overhead line to the canal and the location of any crossing points are not yet known. As noted elsewhere, it will be important to engage with the Trust as the route is refined, and as potential crossings of the canal are identified’.</i></p>	<p>Meetings were held with the Canal and River Trust in February and September 2025, during which matters relating to relevant assets such as culverts and embankments were discussed. Engagement with the Canal and River Trust and associated restoration groups, the Friends of the Cromford Canal and the Derby and Sandiacre Canal Trust, will continue as part of the design and pre-construction planning. Flood risk posed from artificial sources such as canals (including the Trent and Mersey Canal) has been considered in the preliminary FRA (<b>Appendix 9A Preliminary Flood Risk Assessment</b>). A more detailed assessment of the risk posed by artificial sources will be undertaken at the full FRA stage.</p>
EA	<p><i>‘Navigable watercourses within the Order Limits include but are not limited to the River Trent and the River Derwent. It should be noted that watercourses (e.g. canals) may be the responsibility of other stakeholders and the respective stakeholder should be contacted regarding whether the watercourse needs to remain navigable.’</i></p>	<p>Consultation will occur with the relevant stakeholders as the design develops for navigable watercourses within the Study Area. It is noted that the Canal and River Trust provided a response to the Scoping Report. Engagement with the Canal and River Trust, as well as associated restoration groups including the Friends of the Cromford Canal and the Derby and Sandiacre Canal Trust will continue throughout the design development and pre-construction planning phases.</p>
EA	<p><i>‘Watercourse Crossings Section 9.7.11 [of the Scoping Report] explains how on completion of the construction of the Project, it is assumed that temporary access crossings of watercourses would be removed. We would require a commitment to the removal of</i></p>	<p>Upon completion of the construction phase following energisation of the Project infrastructure, reinstatement works are proposed to be undertaken. Temporary watercourse crossings installed for construction access along the</p>

Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
	<i>crossings as this being assumed in the assessment of likely significant effects. Based on this, the hydromorphology of watercourses for all phases should be scoped in until this is known’.</i>	haul roads are proposed to be removed unless otherwise agreed with the landowner and stakeholders. Existing watercourse crossings via agricultural access tracks or routes, are proposed to be used for access to the overhead line for maintenance purposes during the operational phase.
EA	<i>‘Monopiles Section 4.2.13 [of the Scoping Report] discusses pylon type and design. If steel monopiles were proposed for watercourse crossings we would require a robust justification and an understanding of the limitations’.</i>	The exact design and methodology for watercourse crossings required for construction access is yet to be finalised and will be subject to survey and consultation with the relevant statutory bodies. Current proposal will be refined and incorporated within the assessment as part of the ES.

9.3.3 **Table 9.4** provides a summary of the consultations undertaken to inform the hydrology and land drainage assessment to date.

**Table 9.4: Summary of stakeholder engagement in relation to hydrology and land drainage**

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
Meeting July 2025	EA and Derbyshire County Council (LLFA Advisors)	A meeting to introduce the Project to topic experts and to discuss flood risk. This meeting covered an overview of the Project, a summary of flood risk in the Study Area and the flood models available and the WFD water bodies and activities proposed to be screened into the WFD assessment.	Summary of the discussion is presented in the preliminary FRA ( <b>Appendix 9A Preliminary Flood Risk Assessment</b> ). A draft WFD Screening Assessment was issued to the EA on 16 July 2025 for comment. A formal response from the EA was received 1 August 2025. Further details about the WFD response are provided in <b>Appendix 9B Water Framework Directive Screening Assessment</b> .
Meeting Feb 2025 and Sept 2025	Canal and River Trust	<p>Consider engagement with the Canal and River Trust to be essential to ensure that the potential impacts on the canal can be identified and addressed as the scheme is further developed.</p> <p>The Trent and Mersey Canal is correctly identified in the list of watercourses potentially affected by the proposal set out in para. 9.5.5 of the EIA Scoping Report however it is difficult to comment in any detail until the route is refined, and potential crossings of the canal are identified. Subsequently, at follow up meetings held in 2025 with the Canal and</p>	<p>The request for further consultation is acknowledged. Flood risk posed from artificial sources such as canals (including the Trent and Mersey Canal) has been considered in the preliminary FRA (<b>Appendix 9A Preliminary Flood Risk Assessment</b>). A more detailed assessment of the risk posed by artificial sources will be undertaken at the full FRA stage.</p> <p>The emerging design and associated temporary works have been developed to minimise adverse impacts on the Canal and River Trust’s assets. The construction methodology and any potential impacts that could result, will be reported in the final Hydrology and Land Drainage ES chapter.</p>

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes	Response
		<p>River Trust matters relating to relevant assets, such as culverts and embankments, were raised. Information on such assets will be shared once further detailed design is provided to ensure that these are considered appropriately.</p>	<p>Engagement with the Canal and River Trust will continue as part of the design and pre-construction planning. The Project will seek to follow the Canal and River Trust's Code of Practice for third party works as far as reasonably practicable.</p>
Meeting July 2025	Derby and Sandiacre Canal Trust	<p>Requested cognisance of assets associated with the Derby and Sandiacre Canal in proximity to the Project that have been subject to restoration and are earmarked for future restoration.</p>	<p>Engagement with the Canal and River Trust and associated restoration groups including the Derby and Sandiacre Canal Trust, will continue as part of the design and pre-construction planning. The Project will seek to follow the Canal and River Trust's Code of Practice for third party works as far as reasonably practicable.</p>
Meeting March 2024	Friends of Cromford Canal	<p>Requested cognisance of assets of the Cromford Canal in proximity to the Project that have been earmarked for future restoration.</p>	<p>Engagement with the Canal and River Trust and associated restoration groups including the Friends of the Cromford Canal will continue as part of the design and pre-construction planning. The Project will seek to follow the Canal and River Trust's Code of Practice for third party works as far as reasonably practicable.</p>

9.3.4 Stage 1 (non-statutory) consultation was held between May and September 2024. The principal feedback received from Stage 1 (non-statutory) consultation of relevance to this chapter is included in **Table 9.5**, together with a response on how the comments were considered in the Scoping Report and this PEIR.

**Table 9.5: Summary of Stage 1 (non-statutory) consultation in relation to hydrology and land drainage**

Consultee	Summary of Key Topics Raised	Response
Canal and River Trust	<p>The Emerging Preferred Corridor includes a stretch of the Trent and Mersey Canal along the Trent Valley and will need to cross the canal at some point.</p> <p>It is important to consider at what location the overhead line will need to cross the canal. The canal fulfils multiple roles (including ecological, recreational, amenity and historical) which need to be considered in route planning.</p> <p>Cromford Canal and Derby and Sandiacre Canal are restored sections promoted by local canal groups and it is advised that these groups are consulted.</p>	<p>The request for further consultation is acknowledged.</p> <p>The emerging design and associated temporary works have been developed to minimise adverse impacts on the Canal and River Trust’s assets. The construction methodology and any potential impacts that could result, will be reported in the final Hydrology and Land Drainage ES chapter.</p> <p>Engagement with the Canal and River Trust will continue as part of the design and pre-construction planning. The Project will seek to follow the Canal and River Trust’s Code of Practice for third party works as far as reasonably practicable.</p>
South Derbyshire District Council	<p>The Embecouncil expects full consideration to be given to the environmental effects of this project and that these are effectively mitigated as far as possible. This includes flood risk.</p>	<p>An assessment of effects on hydrology and water resource receptors will be presented in the ES. This includes water quality, water resource availability, flood risk, geomorphology and WFD.</p>
EA	<p>A list of key constraints was provided including flood zones, flood defences, statutory main rivers, WFD water bodies and abstractions.</p> <p>Technical advice was provided for flood risk (including modelling and compensatory storage), navigable watercourses, watercourse crossings, setting back from watercourses and defences, permitting, geomorphology, water quality and water resources.</p>	<p>The constraints presented by the EA are acknowledged and have been used to inform the baseline conditions (section 9.5) and design of the Project.</p> <p>The technical advice is acknowledged and further consultation with the EA regarding specific technical areas will take place as the design progresses and to support the assessment of effects in the ES.</p>

## 9.4 Assessment Methodology

- 9.4.1 **Chapter 5 Approach to Preliminary Environmental Information Report** sets out the overarching approach used in developing the preliminary environmental information. This section describes the technical methods used to determine the baseline conditions, receptor sensitivity and magnitude of change. This section also identifies further surveys and assessment that will be undertaken and reported in the ES.

### Technical Guidance

- 9.4.2 The assessment methodology is consistent with guidance set out in LA 113 from the DMRB (Ref 9.33). Whilst primarily intended for use in assessing the impacts of highways projects on the water environment, the methodology is widely accepted for assessing the effects of other types of linear infrastructure. However, the specific details of the methodology, particularly about defining the value of receptors, also draws on experience from previous electricity transmission projects, as well as having regard for the specific characteristics of the water environment in the Study Area.

### Supporting Documents

#### Flood Risk Assessment

- 9.4.3 A supporting FRA is being developed in accordance with the requirements of the NPS EN-1 (Ref 9.11) and EN-5 (Ref 9.12), the NPPF (Ref 9.14), relevant local planning policy and local flood risk management guidelines published by the LLFA.
- 9.4.4 The preliminary FRA (**Appendix 9A Preliminary Flood Risk Assessment**) details the methodology used and investigates all the primary sources of flooding (specifically fluvial and tidal, surface water, reservoir, artificial source and groundwater flooding) based on existing available and online data sources.
- 9.4.5 Changes in flood risk during the construction and operational phases are assessed qualitatively based on professional judgement. The assessment does not include hydraulic modelling, manipulation of existing hydraulic models or other quantitative analysis at this stage (excluding a sample of flood depths in key areas that have been extracted from existing hydraulic models that were received from the EA).
- 9.4.6 The assessment also considers, from a strategic perspective, any anticipated temporary drainage solutions which would be implemented during the construction phase of the Project.
- 9.4.7 Quantitative assessment of flood risk through the hydraulic modelling of watercourses will be undertaken at the ES stage and will be incorporated into the final FRA.

#### Water Framework Directive Assessment

- 9.4.8 The potential impacts to the identified WFD water bodies will be assessed through a WFD assessment, following the Planning Inspectorate's Advice on the Water Framework Directive (Ref 9.30).

9.4.9 A summary of assessment approach and Stage 1 Screening Assessment is included within the PEIR as **Appendix 9B Water Framework Directive Screening Assessment**. It identifies the water bodies to be screened in and which activities of the DCO Project are likely to affect the screened-in water bodies.

9.4.10 A full WFD assessment will accompany the ES.

### Sensitivity

9.4.11 The sensitivity of surface water receptors is a critical consideration in evaluating potential hydrological impacts. It reflects their vulnerability to changes in flow, quality, and ecological function, as well as their resilience to recover from such disturbances. Sensitivity is influenced by factors such as watercourse type, statutory designations (e.g. WFD classifications), policy protections, and informed professional judgement, supported by stakeholder consultation where appropriate.

9.4.12 Criteria for defining the sensitivity and/or value of receptors are outlined in **Table 9.6** which is based on Table 3.70 in DMRB LA 113: Road drainage and the water environment (Ref 9.33).

**Table 9.6: Criteria for determining sensitivity of receptors**

Sensitivity	Typical Criteria	Typical Examples
Very High	Nationally significant attribute of high importance. Essential infrastructure and highly vulnerable flood risk receptors.	<ul style="list-style-type: none"> <li>Watercourse having a WFD classification and with <math>Q95 &gt; 1 \text{ m}^3/\text{s}</math>.</li> <li>Site protected/designated (Special Area of Conservation, Special Protection Area, Site of Special Scientific Interest (SSSI), Ramsar site).</li> <li>Essential infrastructure (e.g. major roads) and flood defence embankments.</li> <li>People, including construction workers, residents and associated users.</li> </ul>
High	Locally significant attribute of high importance. More vulnerable flood risk receptors.	<ul style="list-style-type: none"> <li>Watercourse having a WFD classification and with <math>Q95 &lt; 1 \text{ m}^3/\text{s}</math>.</li> <li>Highly vulnerable development (e.g. residential properties) and associated users, including residents.</li> </ul>
Medium	Moderate quality and rarity. Less vulnerable flood risk receptors.	<ul style="list-style-type: none"> <li>Watercourse not having a WFD classification and with <math>Q95 &gt; 0.001 \text{ m}^3/\text{s}</math>.</li> <li>Less vulnerable development (e.g. agricultural premises and</li> </ul>

Sensitivity	Typical Criteria	Typical Examples
Low	Lower quality.	commercial properties) and associated users. <ul style="list-style-type: none"> <li>Watercourse not having a WFD classification and with Q95 &lt; 0.001 m<sup>3</sup>/s.</li> <li>Agricultural land.</li> <li>Undeveloped land.</li> </ul>

### Magnitude

- 9.4.13 The magnitude of impact in hydrology and land drainage assessments reflects the degree of change imposed on the baseline environment by a proposed development. It is determined by several key factors: the scale of change, which indicates the severity or intensity of alteration to hydrological conditions; the spatial extent, representing the geographical area affected; and the duration and frequency, which describe how long and how often the impact is expected to occur. Together, these parameters help define the significance of potential effects on watercourses, drainage networks, and associated receptors.
- 9.4.14 The criteria used to determine the magnitude of impacts are presented in **Table 9.7**.

**Table 9.7: Criteria for determining magnitude of impact**

Magnitude	General Criteria	Example Criteria
Large	<ul style="list-style-type: none"> <li>• Adverse: Loss/alteration of resource and/or quality and integrity of resource; severe damage to key characteristics, features, or elements.</li> <li>• Beneficial: Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss or extensive change to a designated nature conservation site.</li> <li>• Loss of regionally important public water supply.</li> <li>• Reduction in WFD classification.</li> <li>• High likelihood of pollution from solubles and sedimentation.</li> <li>• High risk of pollution from spillage annually.</li> <li>• A major increase in the likelihood, depth, or extent of flooding as a consequence of the Project (existing receptors) sufficient to put life at risk.</li> <li>• High probability/risk of flooding potentially affecting receptors introduced as part of the Project, sufficient to put life at risk.</li> <li>• Large increase in discharge in sewerage network combined with significant capacity issues of the network.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Adverse: Loss/alteration of resource but not adversely affecting the integrity; partial loss of damage to key characteristics, features or elements.</li> <li>• Beneficial: Benefit to, or addition of key characteristics, features or elements; improvements of attribute quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies.</li> <li>• Contribution to reduction in WFD classification.</li> <li>• Moderate likelihood of pollution from solubles and sedimentation.</li> <li>• Medium risk of pollution from spillage annually.</li> <li>• Some increase in the likelihood, depth, or extent of flooding as a consequence of the Project (existing</li> </ul>

Magnitude	General Criteria	Example Criteria
Small	<ul style="list-style-type: none"> <li>Adverse: Some measurable alteration in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.</li> <li>Beneficial: Minor benefit to, or in addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk or negative impact occurring.</li> </ul>	<p>receptors) which can cause significant damage but is not expected to put life at risk.</p> <ul style="list-style-type: none"> <li>Medium probability/risk of flooding potentially affecting receptors introduced as part of the Project, which can cause significant damage but is not expected to put life at risk.</li> <li>Moderate increase in discharge in the sewerage network combined with some lack of capacity of the network.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>Moderate likelihood of pollution from either solubles or sedimentation.</li> <li>Low risk of pollution from spillage annually.</li> <li>Minor effects on water supplies.</li> <li>Measurable but limited in size or magnitude increase in the probability, depth or extension of flooding (existing receptors).</li> <li>Measurable but limited risk of flooding potentially affecting receptors introduced as part of the Project.</li> <li>Insignificant impact to WFD water bodies at the water body scale.</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Adverse: Very minor loss or detrimental alteration to one or more characteristics, features or elements.</li> <li>Beneficial: Very minor benefit to or positive addition of one or more characteristics, features or elements.</li> </ul>	<ul style="list-style-type: none"> <li>The proposed development is unlikely to affect the integrity of the water environment.</li> <li>No risk to water quality from solubles or sedimentation.</li> <li>Very low risk of pollution from spillage annually.</li> <li>Negligible change in flood risk as a consequence of the Project (existing receptors)/negligible flood risk affecting receptors introduced as part of the Project.</li> </ul>

## Significance of effects

- 9.4.15 The combination of receptor sensitivity and magnitude of impact is used to determine the significance of each effect by using the matrix given in **Table 5.4 of Chapter 5 Approach to Preliminary Environmental Information Report**.
- 9.4.16 Effects which are moderate or above will be considered to be significant.

## Preliminary Assessment Assumptions and Limitations

- 9.4.17 The assessment has been undertaken based on the preliminary Project design information. This information is iterative and will be updated in the ES as the design evolves. This may lead to changes which would be accounted for in the assessment presented in the ES.
- 9.4.18 The following limitations and assumptions have been identified for the assessment within this section:
- the preliminary assessment has relied upon data and records provided by third parties, and therefore it has been assumed that this information is accurate and up to date at the time of reporting.
  - the assessment has been undertaken using the available design information for the Project and the maximum likely extents of land required for its construction, and operation (i.e. the draft Order Limits).
  - site visits were conducted in June 2025. However, access to some watercourses was not possible due to land access constraints and physical obstructions, including dense vegetation and fencing, which limited the extent of the survey in those areas.
  - stakeholder engagement with key regulators such as the EA and LLFA is ongoing to further develop understanding of the key hydrology and land drainage factors. The feedback gleaned will inform the approach to the hydrology and land drainage assessment associated with the Project. This will inform the next stage of assessment through to DCO submission as reported in the ES.

## Further Assessment Within the ES

- 9.4.19 Further data gathering will expand the baseline assessment to be included in the ES.
- 9.4.20 Non-intrusive surveys will include River Condition Assessments (RCA) and Ditch Surveys. These will be carried out using Modular River Physical (MoRPh) surveys on watercourses via a combination of desk-based research and field surveys.
- 9.4.21 Details of water supply and demand requirements during construction and operation will be calculated to ensure that there is minimal impact on local resources and this will be reported in the ES.
- 9.4.22 Hydraulic modelling will be undertaken on key watercourses to enable assessment of flood risk with further detail on proposed modelling contained in the preliminary FRA (**Appendix 9A Preliminary Flood Risk Assessment**). Further flood risk information will be obtained from the statutory consultees and a full FRA will be produced to accompany the ES.

- 9.4.23 A full WFD assessment will be undertaken in line with the screening report (**Appendix 9B Water Framework Directive Screening Assessment**) and will accompany the ES.

## 9.5 Baseline Conditions

### Study Area

- 9.5.1 The Study Area for the hydrology and land drainage assessment comprises the draft Order Limits plus a 500 m buffer.
- 9.5.2 This is considered an appropriate Study Area based on technical knowledge of similar projects and consideration of the distances over which potential significant effects can reasonably be expected to occur.
- 9.5.3 The Study Area is shown on **Figure 9.1**.
- 9.5.4 The preliminary FRA (**Appendix 9A Preliminary Flood Risk Assessment**) and WFD Screening Assessment (**Appendix 9B Water Framework Directive Screening Assessment**) have been prepared to ensure effects on flood risk are assessed at the local catchment scale and effects on WFD water bodies are considered within the relevant operational management catchments.

### Data Collection

#### Desk study

- 9.5.5 The hydrology and land drainage baseline has been developed based on a desk-based assessment of existing data and site walkover. Baseline conditions have been informed using publicly available information from the following information sources:
- Ordnance Survey mapping (Ref 9.41);
  - Department for Environment, Food and Rural Affairs Magic Maps (Ref 9.42);
  - Main River map for England (Ref 9.43);
  - Catchment data explorer database of Cycle 2 and 3 WFD information (Ref 9.44);
  - Humber River Basin District River Basin Management (Ref 9.45);
  - Long term flood risk map for England (Ref 9.46);
  - The Flood Map for Planning (Ref 9.47);
  - The Historic Flood Map (Ref 9.48);
  - Active abstraction data (Ref 9.49);
  - Flood Estimation Handbook Web Service (Ref 9.50);
  - Reservoir Flood Extents (Ref 9.51);
  - British Geological Survey Geology of Britain Viewer (Ref 9.52);
  - Google Street View Mapping (Ref 9.53);
  - Side by side viewer (Ref 9.54);

- Map of River Level Monitoring Stations (Ref 9.55);
- Meteorological (Met) Office Website (Ref 9.56); and
- Groundsure Reports (Ref 9.57).

### Site visit and surveys

- 9.5.6 Site visits were undertaken in June 2025 to inform the baseline assessment.
- 9.5.7 The site visits included a general walkover of watercourses within the Study Area, primarily at the location of any proposed watercourse crossings as part of the Project. Further detail on the proposed watercourse crossings is provided in **Appendix 9C Baseline Information**. Photographs and notes were taken at these locations detailing general observations on water quality, flow dynamics, riparian quality, and geomorphological characteristics.

### Existing Baseline

- 9.5.8 The following section outlines the hydrology and land drainage baseline. The baseline section should be read in conjunction with **Appendix 9C Baseline Information**, which provides detailed baseline data for the main rivers and ordinary watercourses, including findings from site visits and field surveys.

### Climate

- 9.5.9 This section of the PEIR provides an overview of the existing climatic conditions within the Study Area. An analysis of historical climatic data, including temperature and precipitation patterns is provided. This information is essential for understanding the potential impacts of the Project on the local environment.
- 9.5.10 Climate data for the period 1991–2020 was taken from the Met Office website for three weather stations in the vicinity of Study Area, namely Nottingham, Watnall (Ref 9.58), Ashover No 2 (Ref 9.59) and Sutton Bonington stations (Ref 9.60). Average monthly maximum and minimum temperature estimates for the period of 1991–2020 demonstrate that the summer months (June – August) featured the highest monthly maximum temperatures, and the winter months (December – February) featured the lowest monthly minimum temperatures. The temperature profile is consistent with the range to be expected for the Midlands District of England. Average annual total rainfall for each of the proposed route alignment sections is given below.

#### Route Section 1: Chesterfield Substation to Tibshelf

- 9.5.11 The average annual total rainfall in the locality of Section 1 is approximately 908 mm, based on the Ashover No 2 station record (SK 34929 63224) located approximately 8 km west of Section 1. This is higher than the Midlands District average (1991–2020) of 810 mm.
- 9.5.12 The distribution of rainfall throughout the year varied based on the Ashover No 2 station 1991–2020 record. The highest monthly average precipitation was recorded during December (96 mm) followed by November (94 mm). The driest months were March (61 mm) and May (61 mm) followed by April (66 mm).

### Route Section 2: Tibshelf to Ripley

- 9.5.13 The average annual total rainfall in the locality of Section 2 was approximately 908 mm, based on the Ashover No 2 station located north west of Section 2.

### Route Section 3: Ripley to Morley

- 9.5.14 The Nottingham, Watnall station (SK 50425 45561), located approximately 13 km east of Section 3, recorded an average annual total rainfall of approximately 716 mm. This is lower than the Midlands District average (1991–2020).
- 9.5.15 The distribution of rainfall throughout the year varied based on the Nottingham, Watnall station 1991–2020 record. The highest monthly average precipitation was recorded during December (70 mm) followed by November (69 mm). The driest months were March (46 mm) and April (48 mm).
- 9.5.16 Ashover No 2, situated to the north west of the site is closer to the northern part of the section while Nottingham, Watnall station is closer to the middle and southern parts of Section 3.

### Route Section 4: Morley to Ockbrook

- 9.5.17 The average annual total rainfall in the locality of Section 4 was approximately 716 mm, based on the Nottingham, Watnall station record located approximately 10 km east of Section 4.

### Route Section 5: Ockbrook to Aston-on-Trent

- 9.5.18 The average annual total rainfall in the locality of Section 5 was approximately 630 mm, based on the Sutton Bonington station record (SK 50700 25900) located approximately 9 km south east of Section 5. This is lower than the Midlands District average (1991–2020). The distribution of rainfall throughout the year varied based on the Sutton Bonington station 1991–2020 record. The highest monthly average precipitation was recorded during June (64 mm) followed by October (63 mm). The driest months were March (40.6 mm) and February (41.2 mm).

### Route Section 6: Aston-on-Trent to Willington Substation

- 9.5.19 The average annual total rainfall in the locality of Section 6 was approximately 630 mm, based on the Sutton Bonington station record located approximately 12 km south east of Section 6.

### Topography and land use

- 9.5.20 A review of Ordnance Survey mapping (Ref 9.41) shows the land across the Study Area has variations in topography, with elevations ranging between 184 metres above ordnance datum (m AOD) and 33 m AOD. **Table 9.8** shows the elevation ranges of different proposed route alignment sections. This diverse landscape includes low-lying areas associated with watercourses like Alfreton Brook, Bottle Brook, Cuttle Brook, Hell Brook, River Derwent, Thulston Brook, River Trent and Twyford Brook.
- 9.5.21 The land within the Study Area is primarily used for agricultural purposes with few residential and commercial buildings.

**Table 9.8: Topography range for each section**

Route Section	Elevation range (m AOD)
Section 1	82 – 184
Section 2	82 – 150
Section 3	61 – 150
Section 4	57 – 138
Section 5	36 – 76
Section 6	33 – 88

### Flood risk

9.5.22 Flood risk across the Study Area varies and is detailed in the preliminary FRA (**Appendix 9A Preliminary Flood Risk Assessment**).

### Water resources

9.5.23 The Study Area crosses through the catchments of numerous watercourses from Chesterfield to Willington (**Figure 9.1**). Water features within the Study Area range in scale.

9.5.24 Examples of large main rivers that are regionally important include the River Trent, River Derwent and River Amber. The southern part of the Study Area includes the Trent and Mersey Canal. These watercourses support several services, including water supply, receipt and dilution of wastewater discharges, navigation and amenity.

9.5.25 Many small watercourses and drainage ditches that function at the local scale are located throughout the Study Area. In addition, there are lakes at Locko Park, a cluster of surface water bodies to the south of Ambaston, and Mercia Marina between Willington Power Station and the A50.

9.5.26 Several of the watercourses in the Study Area support water interests, supplying licensed abstractions for water supply to agricultural, industrial, and potable uses. Numerous watercourses also receive, dilute and transport permitted wastewater discharges.

9.5.27 Some of the watercourses in the Study Area, such as the River Derwent, have been subject to modifications for the purposes of land drainage and flood defence and have a WFD designation of ‘Heavily Modified Water Body’. Many of the ordinary watercourses in the Study Area also serve a land drainage function and have a relatively low hydromorphological diversity.

9.5.28 Detailed information on watercourses within the draft Order Limits can be found in **Appendix 9C Baseline Information**. Summary of watercourses, licensed abstractions (see **Figure 9.2**) and protected sites in each section of the Study Area are given below.

### Route Section 1: Chesterfield Substation to Tibshelf

9.5.29 There are no statutory main rivers or canals present within Section 1. The hydrological baseline is instead defined by several networks comprising a total of 34

ordinary watercourses. Among these watercourses, the most prominent are Muster Brook, Calow Brook and Westwood Brook. In addition to these named watercourses, there are also 17 ditches that contribute to local land drainage and surface water management. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.

- 9.5.30 Section 1 does not contain any surface water abstraction licences based on the provided data.
- 9.5.31 Section 1 comprises eight active licensed discharge consents that represent a range of sewage and trade effluent discharges across Chesterfield and surrounding areas, with varied receiving water bodies including groundwater, Morton Brook, Muster Brook and tributaries of Calow Brook. These regulated discharges covering storm overflows, final treated effluents and site drainage support both residential infrastructure and industrial operations.
- 9.5.32 Within the Study Area for Section 1, the Williamthorpe Local Nature Reserve (LNR) is a key protected site.

#### Route Section 2: Tibshelf to Ripley

- 9.5.33 Section 2 contains three statutory main rivers which are the Normanton Brook, Alfreton Brook and River Amber. In addition to the main rivers, there are 26 ordinary watercourses, with the most prominent being Morton Brook, Oakerthorpe Brook, Millstone Lane Brook, and Hartshay Brook. Furthermore, there are 12 ditches distributed throughout the area, supporting the overall drainage infrastructure. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.
- 9.5.34 Within Section 2 of the Study Area, a surface water abstraction licence is held by Alfreton Golf Club at Wingfield Road. The licence permits abstraction of up to 136 m<sup>3</sup> per day and 1,364 m<sup>3</sup> annually, with abstraction allowed between April and October. These withdrawals contribute to the local water demand, supporting industrial, commercial, and public service uses within this section.
- 9.5.35 There are currently no known active licensed discharges in this section.
- 9.5.36 Section 2 includes the Oakerthorpe LNR and Doe Hill Country Park pond, which is marked as protected green space in the local plan for Bolsover District (Ref 9.23). In addition, this section falls within a Drinking Water Safeguard Zone (Surface Water), highlighting the need to protect water quality for downstream public supply.

#### Route Section 3: Ripley to Morley

- 9.5.37 Section 3 contains one statutory main river: the Bottle Brook. In addition to the upstream ordinary watercourse section of Bottle Brook, there are 26 ordinary watercourses within the area. The most significant of these include Hartshay Brook, Coppice Brook, Park Brook and Carr Brook. A disused section of the Cromford Canal is also present, providing more ecological and amenity benefits. Furthermore, there are three ditches distributed across the area. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.
- 9.5.38 Section 3 contains a single surface water abstraction licence at Horsley Lodge (located near Park Brook). This licence, held by Horsley Lodge Limited, allows for the abstraction of up to 75 m<sup>3</sup> per day and 7,500 m<sup>3</sup> annually, with the abstraction period running from May to September for agricultural usage.

- 9.5.39 Section 3 includes 12 active licensed discharges, directed into local water bodies like Bottle Brook, Hartshay Brook, Coppice Brook and their tributaries. These discharges, operated by water companies, include pumping stations, sewer storm overflows, and final treated effluent outlets.
- 9.5.40 Section 3 is notable for the presence of Morley Brick Pits, a SSSI, which is protected for its nationally important habitats and species. Additionally, the Hartshay Brook online pond is allocated as a 'Site of Importance for Nature Conservation' in the Amber Valley Local Plan (Ref 9.18). This section is also within both a Drinking Water Safeguard Zone and a Drinking Water Protected Area (Surface Water), underscoring the dual importance of biodiversity conservation and water quality protection in this area.

#### Route Section 4: Morley to Ockbrook

- 9.5.41 There are no statutory main rivers present within Section 4. The surface water network is instead comprised of 20 ordinary watercourses, with the most significant being Stanley Brook, Manor Farm Brook and Ock Brook. Additionally, 13 ditches are distributed throughout the area, predominantly near Manor Farm Brook, supporting land drainage and surface water management. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.
- 9.5.42 Section 4 does not have any discharge or surface water abstraction licences based on the available data.
- 9.5.43 Section 4 does not contain any individually named nature reserves or SSSIs, but it is situated within both a Drinking Water Safeguard Zone and a Drinking Water Protected Area (Surface Water). This means that particular attention must be paid to maintaining water quality and preventing contamination that could affect public water supplies.

#### Route Section 5: Ockbrook to Aston-on-Trent

- 9.5.44 This section contains three statutory main rivers: River Derwent, Ock Brook and Thulston Brook (Ock Brook becomes statutory main river in Section 5). In addition to these main rivers, there are eight ordinary watercourses, with the most significant being Ock Brook and Chellaston Lane Brook. The Derby Canal is present within this section. This has been partially restored to the west of Derby Road (A6005), providing amenity, heritage and biodiversity benefits. The remaining canal running westwards is disused with future ambitions for restoration. Furthermore, there are 28 ditches distributed across the area, predominantly located in the floodplain of the River Derwent. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.
- 9.5.45 A single surface water abstraction licence is present within Section 5. This licence is held by Tarmac Building Products Limited, permitting abstraction of up to 35 m<sup>3</sup> per day and 8,500 m<sup>3</sup> annually, with year-round abstraction rights. These withdrawals contribute to the local water demand, supporting industrial, commercial and public service uses within the area.
- 9.5.46 Section 5 contains a single active licensed discharge located at Ockbrook Nooning Lane Pumping Station, Ockbrook, Derbyshire. This discharge flows into the River Derwent and is categorised as a sewage discharge from a pumping station, operated by Severn Trent Water.

- 9.5.47 Section 5 does not include any specifically named nature reserves or SSSIs, but it is covered by both Drinking Water Safeguard Zones and Drinking Water Protected Areas (Surface Water). These designations highlight the importance of protecting surface water quality in this stretch of the proposed route alignment.

#### Route Section 6: Aston-on-Trent to Willington Substation

- 9.5.48 This section contains a complex hydrological network, with six statutory main rivers present: Cuttle Brook, Hell Brook, Twyford Brook, River Trent, the Old Trent, and Sands Brook. In addition to these main rivers, there are 12 ordinary watercourses, with the most significant being Fox Covert Brook and tributaries of the River Trent. The Trent and Mersey Canal also runs through this section, providing amenity, heritage, biodiversity and drainage benefits to the area. Additionally, there are 37 ditches distributed throughout the section, predominantly located within the floodplain of the River Trent. A full list of watercourses within this section of the Study Area is provided in **Table 9.9**.
- 9.5.49 Section 6 of the proposed route alignment contains the highest concentration of surface water abstraction licences. Notably, Tarmac Aggregates Limited holds a licence permitting abstraction of up to 6,000 m<sup>3</sup> per day and 1,000,000 m<sup>3</sup> annually, for industrial, commercial and public service uses throughout the year. Additionally, this section overlaps with the Swarkestone Quarry dewatering area, where Tarmac Trading Limited holds an abstraction licence allowing up to 16,776 m<sup>3</sup> per day and 5,725,152 m<sup>3</sup> annually, also for year-round industrial, commercial and public service use. The presence of both point and area abstraction licences in this section highlights substantial water demand, supporting activities such as agricultural irrigation and industrial processing.
- 9.5.50 Section 6 contains three discharge consents within the Barrow upon Trent and Findern areas of Derbyshire. These include a soakaway, a direct discharge to a tributary of the River Trent, and treated effluent released into Hell Brook from Findern Sewage Treatment Works.
- 9.5.51 In Section 6, the proposed route alignment passes through a Drinking Water Protected Area (Surface Water). This designation means that safeguarding water quality remains a priority, particularly in relation to any activities that could lead to pollution or increased sedimentation in watercourses. The section also has Chellaston Brickworks LNR.
- 9.5.52 **Table 9.9** summarises the receptors considered in the preliminary assessment. The value of each receptor has been determined in accordance with **Chapter 5 Approach to Preliminary Environmental Information Report**.

**Table 9.9: Identified surface water receptors and associated sensitivity values**

Section	Receptor	Value	Rationale
1	Williamthorpe LNR.	Very High	<ul style="list-style-type: none"> <li>Watercourses which are WFD designated in the Cycle 3 classifications with Q95 &gt; 1 m<sup>3</sup>/s.</li> <li>SSSI/LNR/Protected green spaces/ Site of Importance for nature conservation.</li> <li>Abstractions/drinking water protected zones.</li> </ul>
2	Oakerthorpe LNR and Doe Hill Country Park pond.		
3	Morley Brick SSSI and Hartshay Brook online pond.		
5	River Derwent.		
6	River Trent; Chellaston Brickworks LNR.		
1–6	Essential infrastructure (e.g. major roads) and flood defence embankments.		
1–6	People, including construction workers, residents and associated users.		
2–6	Surface water abstractions/drinking water protected zones/discharges.	High	<ul style="list-style-type: none"> <li>Watercourses which are WFD designated in the Cycle 3 classifications with Q95 &lt; 1 m<sup>3</sup>/s.</li> <li>Canals.</li> </ul>
1	Calow Brook; Calow Brook Tributary 1; Calow Brook Tributary 2; Calow Brook Tributary 5; Locko Brook; Locko Brook Tributary 4; Muster Brook; River Doe Lea Tributary 4; River Rother; Spital Brook; Westwood Brook.		
2	Alfreton Brook; Morton Brook; Morton Brook Tributary 7; Newton Road Brook; Normanton Brook; River Amber.		
3	Bottle Brook; Cromford Canal; Hartshay Brook.		
5	Derby Canal; Thulston Brook.		
6	Cuttle Brook; Hell Brook; Trent and Mersey Canal; The Old Trent; Twyford Brook; Sands Brook.		

Section	Receptor	Value	Rationale
1–6	Highly vulnerable development (e.g. residential properties) and associated users, including residents.		
2	Hartshay Brook Tributary 1; Millstone Lane Brook; Morton Brook Tributary 8; Oakerthorpe Brook.	Medium	<ul style="list-style-type: none"> <li>Watercourses which are not WFD designated in the Cycle 3 classifications with Q95 &gt; 0.001 m<sup>3</sup>/s</li> </ul>
3	Booth's Wood Brook; Booth's Wood Brook Tributary; Carr Brook; Coppice Brook; Hartshay Brook Tributary 2; Park Brook; Street Lane Recreation Ground Brook.		
4	Collins Park Farm; Dale Abbey Brook; Moses Lane Brook; Manor Farm Brook; Ock Brook; Ock Brook Tributary 1; Ock Brook Tributary 2; Stanley Brook; Stanley Brook Tributary.		
5	Chellaston Lane Brook 1; Chellaston Lane Brook 2; Ock Brook; River Derwent Tributary 1; River Derwent Tributary 2; The Lake Tributary.		
6	Cuttle Brook Tributary 1; Main and Barrow Drain Tributary; River Trent Parallel; River Trent Tributary.		
1	Calow Brook Tributary 3; Calow Brook Tributary 4; Calow Brook Tributary 6; Calow Brook Tributary 7; Five Pits Trail Ditch; Hardstoft Road Brook; Heath Brook; Locko Brook Tributary 1; Locko Brook Tributary 2; Muster Brook Tributary 1; Muster Brook Tributary 2; Muster Brook Tributary 3; Muster Brook Tributary 4; River Doe Lea Tributary 1; River Doe Lea Tributary 2; River Doe Lea Tributary 3; Stainsby Pool Tributary 1; Stainsby Pond Tributary 2; Timber Lane 1; Timber Lane 2; Timber Lane 3; Westwood Brook Tributary 1; Westwood Brook Tributary 2.	Low	

Section	Receptor	Value	Rationale
2	Alfreton Brook Tributary 1; Alfreton Brook Tributary 2; Alfreton Brook Tributary 3; Alfreton Brook Tributary 4; Alfreton Brook Tributary 5; Alfreton Brook Tributary 6; Alfreton Brook Tributary 7; Birches Brook; Meadow Farm Brook; Millstone Lane Brook Tributary 1; Millstone Lane Brook Tributary 2; Morton Brook Tributary 4; Morton Brook Tributary 5; Morton Brook Tributary 6; Morton Brook Tributary 9; Oakerthorpe Brook Tributary 1; Oakerthorpe Brook Tributary 2; Shirland Golf Club Brook 3; Wood Lane Brook.		
3	Bottle Brook Parallel; Gipsy Brook; Horsley Road Brook 1; Horsley Road Brook 2; Horsley Road Brook Tributary 2; Kilburn Lake Brook; Killis Lane Brook; Mushroom Wood Brook; Park Brook Tributary 1; Park Brook Tributary 2; Park Brook Tributary 3; Park Brook Tributary 4; Park Brook Tributary 5; Park Brook Tributary 6; Park Brook Tributary 7; Park Brook Tributary 8; Sandy Lane Brook.		
4	Locko Park East Tributary 1; Locko Park East Tributary 2; Locko Park East Tributary 3; Locko Park North Tributary 1; Locko Park North Tributary 2; Morley Brook; Ock Brook Ditch; Ock Brook Tributary 3; Ock Brook Tributary 4; Ock Brook Tributary 5; Moor Lane Brook.		
5	Thulston Brook Tributary		
6	Barrow Drain Tributary 4; Extension of River Trent Tributary; Doles Brook; Fox Covert Brook; Fox Covert Tributary 1; Fox Covert Tributary 2; Fox Covert Tributary 3; Mercia Marina Tributary.		

Section	Receptor	Value	Rationale
1-6	Less vulnerable development (e.g. agricultural premises and commercial properties) and associated users.		
1-6	Ditches (110 in number)	Negligible	<ul style="list-style-type: none"> <li>Ditches which are not WFD designated in the Cycle 3 classifications with <math>Q95 &lt; 0.001 \text{ m}^3/\text{s}</math>.</li> </ul>
1-6	Agricultural land/Undeveloped land.		

## Future Baseline

- 9.5.53 The future baseline relates to known or foreseeable changes to the current baseline in the future, against which the effects of the Project during construction and operation can be assessed. Specifically, it accounts for anticipated changes including those caused by changing climatic conditions, policy, legislation and by other confirmed development projects which would be complete prior to construction of the Project.
- 9.5.54 At this preliminary stage, a full assessment of the implications of any committed development projects with regard to future baseline conditions has not been undertaken. A list of the currently known developments which are anticipated to be included within the future baseline scenario is provided within **Chapter 17 Cumulative Effects** of the PEIR. This will be reviewed and updated as appropriate during development of the ES.

### Topography and land use

- 9.5.55 Land use change can affect the permeability of the ground, which can in turn affect surface water runoff. Given that most of the land within the Study Area comprises productive agricultural land outside of established settlement boundaries, it is unlikely that the runoff regime would change significantly within and surrounding the Study Area. Nevertheless, developers of any new commercial or residential development would be obliged to meet the requirements of the NPPF (Ref 9.14) to ensure that surface runoff is managed within developments so as not to increase flood risk to others.

### Climate and flood risk

- 9.5.56 Climate change is likely to lead to significant changes in hydrological conditions over the lifetime of the Project. Outputs from UKCP18 (Ref 9.61) and the Future Flows and Groundwater Levels (FFGWL) project (Ref 9.62) have been used to assess likely changes in ambient conditions for the purposes of the future baseline.
- 9.5.57 The FFGWL project is the first of its kind to conduct a consistent assessment of the impact of climate change on river flows and groundwater levels across Great Britain. The project modelled a total of 282 river catchments and 24 boreholes to capture the range of climate, land use, geological and geographical characteristics found in England, Wales and Scotland. The outputs aid the study of the impact of climate change on water availability and allows River Basin Management Plans to be tested for robustness (Ref 9.63). For the upstream catchments of the main rivers in the vicinity of the Project, such as the River Dove and the River Derwent, transient flows are projected to decrease at all flow percentiles across all models. For the Q30 flow percentile, a decrease of up to 10 per cent by 2080 is predicted by most models. At the Q90 flow percentile, decreases in flows range between 10 per cent and 40 per cent by 2080, depending on the model used (Ref 9.64). Assessment of seasonal average changes for the same region indicate that in the 2050s winter flows would increase up to 20 per cent in most scenarios, spring flows would decrease by up to 20 per cent in most scenarios, summer flows would decrease by between 20 per cent and 40 per cent in most scenarios and autumn flows would decrease by up to 20 per cent in most scenarios (Ref 9.65).
- 9.5.58 For the FRA, the impacts of climate change on future flood risk would be assessed in line with current EA guidance (Ref 9.66). Current EA recommendations for climate change factors to be applied to extreme rainfall and river flows for the Project area

are summarised in **Table 9.10**, **Table 9.11** and **Table 9.12**. These factors are based on analysis of UKCP18 climate model outputs for rainfall and from hydrological models driven by UKCP18 rainfall outputs. Section 1 is located in the Don and Rother and Derwent Derbyshire Management Catchments. Sections 2, 3, 4 and 5 are located in the Derwent Derbyshire Management Catchment. Parts of Sections 4 and 5 and the whole of Section 6 are located in the Lower Trent and Erewash Management Catchment.

**Table 9.10: Peak river flow climate change allowances**

<b>Allowance Category</b>	<b>Potential Change Anticipated for the 2020s</b>	<b>Potential Change Anticipated for the 2050s</b>	<b>Potential Change Anticipated for 2080s</b>
<b>Don and Rother Management Catchment</b>			
Upper	25%	36%	60%
Higher	15%	21%	38%
Central	11%	15%	28%
<b>Derwent Derbyshire Management Catchment</b>			
Upper	29%	38%	63%
Higher	18%	23%	39%
Central	13%	17%	29%
<b>Lower Trent and Erewash Management Catchment</b>			
Upper	29%	38%	62%
Higher	18%	23%	39%
Central	13%	17%	29%

**Table 9.11: 3.3% Annual Exceedance Probability (AEP) peak rainfall climate change allowances**

<b>Allowance Category</b>	<b>Potential Change Anticipated for the 2050s</b>	<b>Potential Change Anticipated for the 2070s</b>
<b>Don and Rother Management Catchment</b>		
Upper	35%	35%
Central	20%	25%
<b>Derwent Derbyshire Management Catchment</b>		
Upper	35%	35%
Central	20%	25%

Allowance Category	Potential Change Anticipated for the 2050s	Potential Change Anticipated for the 2070s
<b>Lower Trent and Erewash Management Catchment</b>		
Upper	35%	35%
Central	20%	25%

**Table 9.12: 1% AEP peak rainfall climate change allowances**

Allowance Category	Potential Change Anticipated for the 2050s	Potential Change Anticipated for the 2070s
<b>Don and Rother Management Catchment</b>		
Upper	40%	40%
Central	20%	25%
<b>Derwent Derbyshire Management Catchment</b>		
Upper	40%	40%
Central	20%	30%
<b>Lower Trent and Erewash Management Catchment</b>		
Upper	40%	40%
Central	20%	25%

6.5.56 Net sea level rise in Northern England would be lower than in the South due to glacial isostatic adjustment, which causes the northern parts of the UK to rise slowly. In the Humber region, net sea level rise from the year 2000 is projected to increase by 1.15 m to 1.55 m by 2125, based on higher central and upper end allowances (Ref 9.66). However, the Project area lies outside any land impacted by relative sea level rise.

#### Water quality and WFD status

9.5.59 The current overall status of WFD-designated water bodies within the Study Area ranges from Good to Poor. It is anticipated that, in alignment with WFD objectives, the future status of water bodies in the Poor category would improve, ultimately achieving Good ecological status. However, as the sensitivity of WFD water bodies is not determined solely by their current classification, this variation in status does not influence the assessment relative to either the existing or future baseline conditions.

9.5.60 The specific reasons for not achieving Good status are outlined in **Appendix 9B Water Framework Directive Screening Assessment**, which also provides further detail on the WFD context and methodology applied in this assessment.

## Water resources

- 6.5.60 The location and rate of surface water abstractions in the area could vary over time. Any new licences would be subject to volume, hands-off flow and/or minimum residual flow restrictions to ensure sufficient flow remained for environmental support purposes.
- 9.5.61 With regard to flood risk and land drainage, future baseline conditions would be forecast, drawing on current best practice guidelines (Ref 9.66) taking into account the likely impacts of climate change on rainfall intensities, and where applicable peak river flows. These future conditions would be referenced to factor climate change resilience into the Project design, for example with regards to managing surface water runoff from any operational infrastructure.
- 9.5.62 The effects of known future developments that share the same hydrological catchment as the Study Area would also be considered, in terms of the potential for these developments to impact the status of water receptors.

## 9.6 Design Embedded and Good Practice Mitigation Measures

- 9.6.1 As set out in **Chapter 5 Approach to Preliminary Environmental Information Report**, mitigation measures fall into one of three categories: design embedded mitigation measures; good practice measures; and additional mitigation measures. Those measures relevant to the assessment of hydrology and land drainage effects are set out below.

### Design Embedded Mitigation Measures

- 9.6.2 The Project is being designed to avoid sensitive receptors as far as practicable. This is in accordance with industry best practice as well as consideration of the 'Holford Rules' (Ref 9.67) applicable to routing of the proposed route alignment and the 'Horlock Rules' (Ref 9.68) which apply to design and siting of substations. These approaches are explained in further detail within the **Chapter 3 Main Alternatives Considered**. Principles include, but are not limited to, seeking to avoid areas of highest amenity, cultural or scientific value, taking advantage of natural screening provided by existing landform and features (e.g. woodland) and keeping visual, noise and other environmental effects to a minimum.
- 9.6.3 Input from environmental specialists will be an integral part of the ongoing design development process for the proposed works, to ensure that potential environmental impacts are avoided or reduced as far as reasonably practicable. This will inform decisions regarding the siting of substation(s) and the routing of overhead infrastructure as well as the siting of temporary works during construction and associated ancillary works.
- 9.6.4 The draft Order Limits have been located to avoid sensitive water environment and flood risk receptors (from all sources), where practicable. Whilst the Sequential Test within the NPPF (Ref 9.14) cannot rely on mitigation measures that require active maintenance, the following measures are proposed to be embedded within the design to reduce impacts to the water environment and flood risk:
- Any flood protection measures for the substation are to be designed in accordance with National Grid's technical specifications for substation design, other internal guidance and relevant planning policy requirements to ensure no

increased flood risk to third parties. The Horlock Rules would also be applied whilst undertaking siting studies (Ref 9.68).

- substation surface water drainage systems will be designed to provide attenuation of runoff from impermeable surfaces at greenfield rates with an allowance for climate change and include appropriate pollution prevention measures, incorporating the use of SuDS as far as practicable.
- any requirements for water supply and foul water treatment and disposal for office and welfare facilities at substation(s) are proposed to be designed to minimise impacts on water resources and receiving water quality, for example, by reusing water wherever practicable.
- for haul roads required for construction access, crossings of main rivers will be avoided where reasonably practicable. If crossings are necessary, these would comprise of either clear span bridges or suitable culverts subject to design, constructability, and site constraints.
- where highway improvements are required on the local road network to facilitate construction access such as carriageway widening which may potentially involve interaction with existing drainage ditches, a suitable culvert or diversion of the ditch subject to design, constructability and site constraints would be implemented subject to obtaining the relevant consents.
- pylons will not be located within the relevant permitting stand-off distances around watercourses, where practicable. Specifically, for non-tidal main rivers, a minimum distance of 8 m from the bank top or from any flood defence structure will be maintained where practicable. If works are required within 8 m of a main river or flood defence, a Flood Risk Activity Permit will be obtained and environmental requirements of this permit will be satisfied. Changes to ordinary watercourses that might obstruct or alter the flow of an ordinary watercourse will be subject to further review, and Ordinary Watercourse Consent (OWC) will be sought and obtained, where relevant, prior to any works being undertaken.

9.6.5 The preliminary assessment of effects presented herein assumes that the embedded design mitigation set out above will be implemented. The specific details of these measures will be developed for the ES for the DCO application.

## Good Practice Mitigation Measures

9.6.6 A preliminary CoCP is provided in **Appendix 4A Draft Outline Code of Construction Practice**. The control measures relevant to the hydrology and land drainage assessment for the Project include general site management that in addition to hydrology specific measures will help manage impacts associated with the construction phase. These include good site management and control measures as outlined in measures GG01, GG02, GG03, GG04, GG15 and GG21 of the CoCP.

9.6.7 The control and management measures included within this document specific to hydrology and land drainage include:

- HD01: Environmental permits and consents for all qualifying works, e.g. dewatering of excavations, working in, over or under relevant watercourses will be secured where these are required.
- HD02: Where practicable, stockpiles of soil would be located a suitable distance from watercourses.

- HD03: Riverbank and in-channel vegetation would be retained where not directly affected by construction works, ecological mitigation and operation of the Project infrastructure. Natural bed substrate would be provided where temporary culverts are installed to facilitate access and crossings of Main Rivers would be either culvert or an open span bridge where access is required subject to design, constructability, and site constraints.
  - Once the temporary culvert is installed, the area above the temporary culvert would be backfilled with suitable engineering material, such as construction mats or engineered fill, placed over the backfilled area to permit the passage of plant, equipment, materials, and people. Temporary culverts would be sized to reflect the span width, profile and the estimated flow characteristics of the watercourse under peak flow conditions and kept free from debris. Where used, temporary bridges would be designed specifically to consider the span length, and the weight and size of plant and equipment that would cross the bridge. Any culverted/bridged crossing would be subject to the appropriate consent by the relevant drainage authority (Flood Risk Activity Permit from the Environment Agency for Main Rivers, Ordinary Watercourse Consent (OWC) from the Lead Local Flood Authority (LLFA) or Internal Drainage Board (IDB) for ordinary watercourses).
  - On completion of the works, temporary crossings would be removed unless otherwise agreed with the landowner, relevant authorities and stakeholders. Where temporary crossings are removed, there would be reinstatement of the riparian vegetation and natural bed of the watercourse.
- HD04: Where construction activities take place in Flood Zone 3, work areas would be laid out in accordance with the Sequential Approach at the site level and incorporate flood resilience measures where necessary. Storage of construction equipment and materials at active work fronts and in temporary laydown areas would be done in such a way as to avoid forming barriers to floodplain flows.
- HD05: In accordance with EA guidance, LLFA and IDB requirements, buffers between pylons and watercourses would be adhered to where practicable.
- HD06: Fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. In the event of a significant spill during construction, all relevant landowners/tenants and stakeholders would be contacted in a timely manner, to determine if there are any private water supplies that might be affected; an assessment of the likelihood of groundwater contamination reaching identified private water supplies would be undertaken; and, if deemed necessary, appropriate measures would be implemented to resolve the issue.
- HD07: All refuelling, oiling and greasing of construction plant and equipment would take place above portable spill containment mats and also away from drains as far as is reasonably practicable.
- HD08: Vehicles and plant would not be left unattended during refuelling.
- HD09: Appropriate spill kits would be made available.
- HD10: Potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate.

- HD11: Stored flammable liquids such as diesel would be protected either by double bunded tanks or stored in a bunded area with a capacity of 110 per cent of the maximum stored volume.
- HD12: Wash down of vehicles and equipment would take place in designated areas within construction compounds. Wash water would be prevented from passing untreated into watercourses.
- HD13: Runoff across the site would be controlled through a variety of methods including but not limited to, header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding and the like. These provisions would use drainage hierarchy and SuDS principles.
- HD14: An Emergency Response Plan would be developed for the construction phase which would outline procedures to be implemented in case of unplanned events, including but not limited to extreme weather events, flood response and evacuation procedures, and pollution incidents.
- HD15: The Main Works Contractor would subscribe to the EA's Floodline service, which provides advance warning of potential local flooding events, and subscribe to the Met Office's Weather Warnings email alerts system and any other relevant flood warning information.
- HD16: Active private water supplies and land drains would be identified with landowners through landowner discussions. Appropriate measures would be considered during construction to mitigate the risk of damage / loss.
  - Severance of existing land drainage routes, including agricultural field drainage systems would be managed during construction through provision of temporary alternative drainage routes, and these drainage systems would be permanently reinstated where practicable to ensure their existing function is maintained. This would also take into account surface water runoff measures and includes the avoidance of the creation of preferential drainage pathways.
- HD17: Temporary cofferdams would be used if required, to exclude work areas from the waterbodies, thus reducing the risk of increased sediment loads or hazardous substances entering the main water flow.
- HD18: During open cut crossings of watercourses in order to bury, if necessary, the watercourses would be temporarily dammed and over-pumped.
- HD19: Where practicable, construction works would avoid works on watercourses during high flow events to reduce the risk of fine sediment release and reduce the risk to construction staff from flooding.
- HD20: The Project would incorporate appropriate surface water drainage measures into its final design for the haul roads, access tracks, works compounds and laydown areas so that they do not lead to a significant increase in flood risk and silt run off. Temporary haul routes within Flood Zone 3 and areas of high and medium risk of flooding from surface water would be removed at the end of the construction phase and the ground surface would be reinstated to pre-project levels where practicable. The potential impact of temporary haul routes, which cross the floodplain, on flood flows would be assessed and the assessment and design of the temporary haul route would be agreed with the Environment Agency through the Flood Risk Activity Permit application and with the LLFA through the OWC process.

## Additional Mitigation Measures

- 9.6.8 Additional mitigation measures are those required to reduce likely significant adverse environmental effects which may still occur despite the inclusion of the embedded design and control measures described above.
- 9.6.9 Based upon the preliminary assessment, additional mitigation measures are not anticipated to be required within the Study Area in relation to hydrology and land drainage. However, the requirement for additional mitigation will be reviewed subject to the completion of further assessment and development of the ES.
- 9.6.10 No additional mitigation measures have been assumed within the preliminary assessment of effects reported in the following sections.

## 9.7 Preliminary Assessment of Effects

- 9.7.1 The following section presents the findings of the preliminary assessment of effects upon the receptors identified within the Study Area, as a result of construction and/or operational activities.
- 9.7.2 The preliminary assessment of effects reported below considers the Design and Control measures, as previously described under section 9.6.
- 9.7.3 A summary of all non-significant effects is also included in **Table 9.13**.
- 9.7.4 It is noted that this is an ongoing assessment and is subject to change due to the ongoing development of the design of the Project, Stage 2 (statutory) consultation feedback and further stakeholder engagement. A full assessment will be included within the ES submitted with the DCO application.

## Likely Significant Effects

### Construction

- 9.7.5 Based upon the preliminary assessment, no significant effects are predicted for hydrology and land drainage receptors within the Study Area, as a result of the construction phase of the Project.

### Operation

- 9.7.6 Based upon the preliminary assessment, no significant effects are predicted for hydrology and land drainage receptors, as a result of the operational phase of the Project.

## Non-Significant Effects

- 9.7.7 For completeness, **Table 9.13** summarises the findings of the preliminary assessment with respect to those impacts that are not predicted to result in significant hydrology and land drainage effects during construction and operation.
- 9.7.8 The below potential indirect impacts to surface waters via groundwater interaction have been assessed in **Chapter 10 Geology and Hydrogeology**:
- impact from any dewatering for construction from temporary works impacting groundwater – surface water interactions; and
  - impact on surface water quality and resource availability due to any potential impacts on ground water quality and groundwater resource receptors.

**Table 9.13: Preliminary summary of non-significant hydrology and land drainage effects**

<b>Impact</b>	<b>Receptor</b>	<b>Value of Receptor<sup>2</sup></b>	<b>Magnitude of Change<sup>3</sup></b>	<b>Significance<sup>4</sup></b>	<b>Rationale</b>
<b>Construction Phase</b>					
Water Quality and Water Resource Receptors					
Impacts on water resources.	Surface water abstractions/discharges.	Very High	Negligible	<b>Not significant (minor)</b>	During the construction phase there is potential for water resources to be impacted through increased water supply and demand requirements. Any abstractions and discharges during the construction phase would be controlled via permits and environmental requirements would be satisfied. These effects are considered <b>not significant</b> .

<sup>2</sup> The value of receptor is defined using the criteria set out in **Table 9.6** and is defined as Negligible, Low, Medium, High and Very High.

<sup>3</sup> The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Table 9.7** and is defined as Negligible, Small, Medium and Large.

<sup>4</sup> The significance of the environmental effects is based on the combination of the value of a receptor and the magnitude of change and is expressed as major (**significant**), moderate (**potentially significant**) or minor/negligible (**not significant**), subject to the evaluation methodology outlined in **Chapter 5 Approach to Preliminary Environmental Information Report**.

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
Impact to water quality and hydromorphology by entrainment of loose sediment in runoff from construction activities.	Chellaston Brickworks LNR; Morley Brick SSSI; Oakerthorpe LNR; Williamthorpe LNR; Doe Hill Country Park pond; Hartshay Brook online pond; surface water abstractions and drinking water protected zones.	Very High	Negligible	<b>Not significant (minor)</b>	During the construction phase there is potential to generate sediment laden runoff which could, in absence of appropriate good practice and embedded mitigation measures, adversely affect water quality in surface water receptors. Activities that could potentially produce sediment-laden runoff include:  construction and removal of haul roads, construction compounds and working areas (including topsoil stripping, earthworks and excavations); runoff from installed haul roads, pylon foundations, temporary construction compounds and working areas; direct sediment disturbance from in channel works for the
	River Derwent and River Trent.	Very High	Negligible	<b>Not significant (minor)</b>	
	Cromford Canal; Derby Canal; and Trent and Mersey Canal.	High	Negligible	<b>Not significant (minor)</b>	
	Main rivers and ordinary watercourses with WFD status and Q95 < 1 m <sup>3</sup> /s (referred to in <b>Table 9.9</b> as having a high value).	High	Negligible	<b>Not significant (minor)</b>	
	Ordinary watercourses with Q95 > 0.001 m <sup>3</sup> /s (referred to in <b>Table 9.9</b> as having a medium value).	Medium	Negligible	<b>Not significant (negligible)</b>	
	Ordinary watercourses with Q95 < 0.001 m <sup>3</sup> /s	Low	Negligible	<b>Not significant (negligible)</b>	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
	(referred to in <b>Table 9.9</b> as having a low value).				<p>construction of haul road crossings; direct sediment disturbance from trenching of below-ground cables for NGED works; and the use and management of soil stockpiles.</p> <p>The assessment of suspended sediment-related effects is considered precautionary, given that the watercourses across the Study Area are likely to experience baseline variation in suspended sediment due to agricultural practice in the area.</p> <p>As the designated LNRs and SSSIs are located at least 150 m away from the proposed works, the potential for adverse impacts is considered negligible due to either the absence of a direct hydrological connection</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>or the sufficient downstream distance allowing for effective dilution of any pollutants.</p> <p>Good practice environmental measures outlined in <b>Appendix 4A Draft Outline Code of Construction Practice</b> (GG03, GG15, GG21, HD02, HD12, HD13, HD17 and HD19) would render effects on the watercourses as <b>not significant</b>.</p>
Impact to hydromorphology and flow conveyance as a result of increased sediment inputs from watercourse disturbance.	Calow Brook; Calow Brook Tributary 1 and 5; Morton Brook; Morton Brook Tributary 7; Muster Brook; River Doe Lea Tributary 4; Westwood Brook; and Thulston Brook.	High	Negligible	<b>Not significant</b> (minor)	Works directly affecting watercourses, namely a temporary culvert or a clear span bridge for haul road crossing, construction of drainage outfall for Chesterfield Substation, or open-cut crossing for NGED
	Chellaston Lane Brook 1; Chellaston Lane Brook 2; Coppice Brook; Millstone Lane Brook; Moses Lane Brook; Morton Brook	Medium	Negligible	<b>Not significant</b> (negligible)	works, could result in a direct impact on their hydromorphology. The direct impacts would be mitigated to an extent

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
	Tributary 8; Ock Brook; Ock Brook Tributary 2; Park Brook; and River Trent Tributary.				with the implementation of the measures set out within <b>Appendix 4A Draft Outline Code of Construction Practice.</b>
	Alfreton Brook Tributary 3, 4 and 7; Ambaston Ditch 9, 11, 13, 16,17, 18 and 20; Borrowash Brook; Borrowash Brook Tributary 1; Church Street Ditch 1; Coppice Brook Ditch 2; Extension of River Trent Tributary; Frizams Lane Ditch; Merrybower Ditch 3; Morton Brook Tributary 4; Killis Lane Brook; Locko Park East Tributary 1; Manor Farm Ditch 4; Mushroom Wood Brook; Muster Brook Tributary 2; Ock Brook Tributary 3 and 5; Ock Brook Ditch 3; Park Brook Tributary 4, 5, 7 and 8; Power Station Ditch 1 and 7; Westwood Brook Tributary 1; Wood Lane Brook 16, 17, 18 and 20.	Low	Negligible	<b>Not significant</b> (negligible)	<p>This includes HD03, HD04, HD17 and HD18. As a result, effects are <b>not significant.</b></p> <p>Watercourse crossings for the haul road would be avoided where practicable. Where there would be a crossing of the watercourses listed with a haul road, via a temporary culvert, the footprint of these would be kept to a minimum and efforts would be made to ensure minimum change to existing morphology and flow conveyance, by adhering to embedded environmental measure HD03.</p> <p>NGED works may involve the burying of cables. Where cables</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>are to be buried beneath a watercourse, a worst-case approach has been adopted for this assessment and it is assumed these would be buried via an open trench. There is potential for increased sediment inputs to the trenched watercourse; however, this impact is mitigated by HD17 and HD18.</p> <p>Any potential increases in sediment-laden runoff from working areas would be mitigated using the embedded environmental measures outlined in <b>Appendix 4A Draft Outline Code of Construction Practice</b> (HD17 and HD18). As a result, effects are <b>not significant</b>.</p>
Impact to water quality by spillage of pollutants.	Chellaston Brickworks LNR; Morley Brick SSSI; Oakerthorpe LNR; Williamthorpe	Very High	Negligible	<b>Not significant</b> (minor)	As the designated LNRs and SSSIs are located at least 150 m away from the proposed

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
	LNR; Doe Hill Country Park pond; Hartshay Brook online pond; surface water abstractions and drinking water protected zones.				<p>works, the potential for adverse impacts is considered negligible due to either the absence of a direct hydrological connection or the sufficient downstream distance allowing for effective dilution of any pollutants.</p> <p>The construction works have the potential to affect water quality conditions within surface water features via:</p> <ul style="list-style-type: none"> <li>accidental spillage of fuel, oil, concrete or other chemicals used during construction; if used, this could include horizontal directional drilling fluid (frac out) breaching the surface and reaching surface water receptors;</li> <li>mobilisation/leaching of contaminants from historical soil</li> </ul>
	River Derwent and River Trent.	Very High	Negligible	<b>Not significant (minor)</b>	
	Cromford Canal; Derby Canal; and Trent and Mersey Canal.	High	Negligible	<b>Not significant (minor)</b>	
	Main rivers and ordinary watercourses with WFD status and Q95 < 1 m <sup>3</sup> /s (referred to in <b>Table 9.9</b> as having a high value).	High	Negligible	<b>Not significant (minor)</b>	
	Ordinary watercourses with Q95 > 0.001 m <sup>3</sup> /s (referred to in <b>Table 9.9</b> as having a medium value).	Medium	Negligible	<b>Not significant (negligible)</b>	
	Ordinary watercourses with Q95 < 0.001 m <sup>3</sup> /s (referred to in <b>Table 9.9</b> as having a low value).	Low	Negligible	<b>Not significant (negligible)</b>	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>contamination during excavation works; and</p> <ul style="list-style-type: none"> <li>contaminated water pumped from excavations.</li> </ul> <p>The implementation of the embedded mitigation measures outlined in the <b>Appendix 4A Draft Outline Code of Construction Practice</b> (GG02, GG03, GG04, GG21, HD06, HD07, HD08, HD09, HD10, HD11, HD12, HD13 and HD14) designed to prevent surface water pollution (for example implementation of good working practices with adherence to the Draft Outline CoCP) would ensure the effect on surface water receptors and water resources is <b>not significant</b>.</p>
Flood Risk and Land Drainage					

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
Changes to surface water flood risk due to increase in runoff rates resulting from ground disturbance and creation of impermeable surfaces, and to changes in surface water runoff pathways due to amended ground surface levels.	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant</b> (minor)	It is anticipated that during construction, there may be temporary changes to land surface permeabilities. Changes to surfacing resulting from temporary works could reduce rainfall infiltration rates, increase runoff rates, and induce overland flow during construction. This could contribute to localised changes to the land drainage regime, resulting in ponding of water or waterlogging of soils. Areas with a sloping topography where topsoil has been stripped would be particularly vulnerable to these changes. However, impacts would be temporary and localised, and therefore negligible, provided that mitigation measures are effectively implemented during construction.
	More vulnerable land uses.	High	Negligible	<b>Not significant</b> (minor)	
	Less vulnerable land uses.	Medium	Negligible	<b>Not significant</b> (negligible)	
	Water compatible land uses.	Low	Negligible	<b>Not significant</b> (negligible)	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>Any potential watercourse diversions may also disrupt or sever existing field drainage systems, dependent on the alignment of any diversions. The design remains in development with the above aspects anticipated.</p> <p>The proposed good practice mitigation measures to prevent an increase in surface water flood risk during construction are set out in <b>Appendix 4A Draft Outline Code of Construction Practice</b> and include HD13 and HD16.</p> <p>Based upon the implementation of these embedded mitigation measures, effects on flood risk receptors due to changes in runoff rates and pathways during the construction</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					phase are <b>not significant</b> .
Changes to watercourse and floodplain flow conveyance arising from the presence of new temporary watercourse crossings, open trench excavations for burying cables and haul roads in the floodplain, increasing the risk of flooding to flood risk receptors.	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant</b> (minor)	There may be temporary watercourse crossings proposed within the draft Order Limits. In the absence of appropriate measures, these crossings could impact flow conveyance, which could subsequently influence flood risk upstream of the watercourse crossing. Similarly, temporary blockage of watercourses for trenches to bury cables as part of the NGED works could increase flood risk upstream of the trench. Also, the proposed haul road across the floodplain of the River Derwent could impact flood flows across the floodplain if insufficient mitigation is embedded into the design. This could
	More vulnerable land uses.	High	Negligible	<b>Not significant</b> (minor)	
	Less vulnerable land uses.	Medium	Negligible	<b>Not significant</b> (negligible)	
	Water compatible land uses.	Low	Negligible	<b>Not significant</b> (negligible)	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>impact flood risk in the vicinity of the haul road. The proposed embedded mitigation measures to prevent an increase in surface water and fluvial flood risk due to changes in existing watercourse and floodplain flow conveyance are set out in <b>Appendix 4A Draft Outline Code of Construction Practice</b> and include HD03, HD04, HD05, HD14, HD15, HD18 and HD19.</p> <p>Based upon the implementation of these measures, predicted effects upon flood risk due to new or temporary watercourse crossing are <b>not significant</b>.</p>
Changes to flood risk from different sources, including sewers, groundwater,	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant</b> (minor)	Flooding from different sources has the potential to increase flood risk on and off site during the construction
	More vulnerable land uses.	High	Negligible	<b>Not significant</b> (minor)	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
artificial water bodies, reservoirs and land drainage.	Less vulnerable land uses.	Medium	Negligible	<b>Not significant</b> (negligible)	<p>phase. These will be assessed in an FRA which will accompany the ES. The ES will assess significant effects from all sources of flood risk, where significant effects are likely.</p> <p>The proposed embedded mitigation measures to prevent an increase in surface water and fluvial flood risk are set out in <b>Appendix 4A Draft Outline Code of Construction Practice</b> and include HD03, HD04, HD05, HD14, HD15, HD18 and HD19. These measures would also help to minimise flood risk from different sources.</p> <p>Predicted effects are considered <b>not significant</b>.</p>
	Water compatible land uses.	Low	Negligible	<b>Not significant</b> (negligible)	

## Operational Phase

Water Quality and Water Resource Receptors

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
Impacts on water resources.	Surface water abstractions/discharges.	Very High	Negligible	<b>Not significant</b> (minor)	During the operational phase there is potential for water resources to be impacted through increased water supply and demand requirements. Any abstractions and discharges during the operational phase would be controlled via permits and environmental requirements would be satisfied. These effects are considered to be <b>not significant</b> .
Increased pollution from storage of potential pollutants such as oil-filled transformers.	Williamthorpe LNR.	Very High	Negligible	<b>Not significant</b> (minor)	The receptor is located approximately 3 km away from the Chesterfield Substation allowing for effective dilution of any pollutants, and therefore this is not significant.
	Calow Brook Tributaries.	Low to High	Negligible	<b>Not significant</b> (negligible to minor)	The new 400 kV Chesterfield Substation has the potential to affect water quality conditions and

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>therefore, aquatic environment receptors within the associated water features via the introduction of contaminants.</p> <p>The substation drainage design would incorporate suitable pollution prevention measures for surface runoff through the use of SuDS, plus containment and oil interceptors for transformers as required. Foul drainage arisings from welfare facilities on the site would either be discharged to the mains sewer network / tankered off site to an appropriately permitted treatment facility / managed on site using a suitable permanent site treatment plant.</p> <p>Overhead line maintenance would involve light vehicles using existing</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>agricultural access and would not involve significant ground disturbance. Therefore, the impacts of the operation on aquatic environment receptors and water resources are considered <b>not significant</b>.</p>
<p>Impact to water quality from surface water drainage of new infrastructure.</p>	<p>Calow Brook Tributary 5.</p>	<p>High</p>	<p>Negligible</p>	<p><b>Not significant</b> (minor)</p>	<p>Surface water drainage from the new 400 kV Chesterfield Substation is proposed to be discharged to Calow Brook Tributary 5. The proposed infrastructure includes multiple water quality protection measures within the design, including filter drains, penstocks, retention separators, and attenuation ponds. These measures are expected to effectively mitigate potential water quality impacts. Therefore, the potential impact to the water quality of this watercourse is</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
Impact to geomorphology of the channel from permanent features on the watercourse.	Calow Brook Tributary 5.	High	Negligible	<b>Not significant</b> (minor)	<p>considered <b>not significant</b>.</p> <p>The introduction of a permanent outfall structure on the bank of the watercourse is expected to result in a negligible impact on channel geomorphology. This is considered a localised effect that does not impede natural flow patterns or channel migration. To mitigate potential impacts, sediment-laden runoff would be stored and treated on site prior to discharge, ensuring that sediment loads are managed effectively and would not significantly affect geomorphological processes in the receiving watercourse. Therefore, potential impacts to the geomorphology of this watercourse are considered <b>not significant</b>.</p>

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
Flood Risk and Land Drainage					
Changes to surface water flood risk due to increase in runoff rates resulting from the creation of impermeable surfaces, due to introduction of new outfall structure, improvement to local highways and to changes in surface water runoff pathways due to amended ground surface levels.	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant (minor)</b>	It is assumed that there is no significant increase in permanent impermeable area associated with the foundation elements of the pylons. Permanent impermeable surfaces are assumed to include tarmac access roads to and within the substation and concrete and/or tarmac hardstanding within the substation boundaries and associated building footprints. Also impermeable surface area on local highways may be increased as a result of highway improvements necessary to facilitate construction access such as carriageway widening. Appropriate permanent drainage design would be incorporated for the proposed impermeable surfaces associated with the substation and
	More vulnerable land uses.	High	Negligible	<b>Not significant (minor)</b>	
	Less vulnerable land uses.	Medium	Negligible	<b>Not significant (negligible)</b>	
	Water compatible land uses.	Low	Negligible	<b>Not significant (negligible)</b>	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					<p>local highway improvements. Given that the design of the Project remains in development, this is based upon a precautionary approach.</p> <p>The new outfall structure is designed to discharge at a controlled rate and is positioned to avoid interference with natural flow paths or channel migration, contributing negligible impact.</p> <p>Overhead line maintenance is assumed to involve light vehicles using existing agricultural access and not involve significant ground disturbance. Therefore, the impacts of the operation of Project infrastructure on flood risk receptors are considered <b>not significant</b>.</p>
Change to fluvial flood risk due to loss of floodplain	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant</b> (minor)	There is potential that the foundation design for pylons 4CW141 and

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
capacity from concrete plinths on Pylons 4CW141 and 4CW142.	More vulnerable land uses.	High	Negligible	<b>Not significant</b> (minor)	<p>4CW142 may comprise of a piled solution with concrete plinths (pile caps) raised above existing ground level due to them being sited within the area of a historic landfill to minimise intrusive works and disturbance of landfill material. This would result in a loss of floodplain storage which may increase flood risk elsewhere.</p> <p>Hydraulic modelling of the River Derwent and its floodplain will determine if flood risk is increased as a result of these plinths and if compensatory flood storage or alternative mitigation is required. This modelling is proposed to be completed to inform the FRA to be submitted as part of the DCO application. With appropriate mitigation adopted as a result of</p>
	Less vulnerable land uses.	Medium	Negligible	<b>Not significant</b> (negligible)	
	Water compatible land uses.	Low	Negligible	<b>Not significant</b> (negligible)	

Impact	Receptor	Value of Receptor <sup>2</sup>	Magnitude of Change <sup>3</sup>	Significance <sup>4</sup>	Rationale
					the flood modelling assessment, the impact on fluvial flood risk is considered <b>not significant</b> .
Changes to flood risk from different sources, including sewers, artificial water bodies, reservoirs and land drainage.	Essential infrastructure or highly vulnerable land uses.	Very High	Negligible	<b>Not significant</b> (minor)	Flooding from different sources has the potential to increase flood risk on and off site during the operational phase. These will be assessed in an FRA which will accompany the ES. The ES will assess significant effects from all sources of flood risk, where significant effects are likely.  Hydraulic modelling of watercourses, the incorporation of appropriate land levels and SuDS drainage would help to minimise flood risk from other sources. Predicted effects are considered <b>not significant</b> .
	More vulnerable land uses.	High	Negligible	<b>Not significant</b> (minor)	
	Less vulnerable land uses.	Medium	Negligible	<b>Not significant</b> (negligible)	
	Water compatible land uses.	Low	Negligible	<b>Not significant</b> (negligible)	

## 9.8 Potential Additional Mitigation Measures

- 9.8.1 This assessment is preliminary as it is based on the proposed design to date.
- 9.8.2 During detailed design or as new information becomes available (for example, from undertaking hydraulic modelling to assess fluvial flood risk in more detail or from further consultation with the statutory consultees), additional mitigation measures may need to be considered. Any additional mitigation measures will be detailed in the ES and supporting appendices.
- 9.8.3 The preliminary assessment above has not identified any significant effects and as such no mitigation over and above that already identified has been suggested.

## 9.9 Monitoring

- 9.9.1 Although no significant effects have been identified within this assessment, given the hydrological sensitivity, it may be necessary to undertake monitoring during the construction phase for assurance purposes. The requirement for this will be assessed further within the ES when further characterisation of the hydrological regime has been undertaken.

## 9.10 Residual Effects

- 9.10.1 In this preliminary assessment, all of the Project potential effects have been determined as **not significant**. The assessment, including residual effects, will be updated as new information becomes available and will be detailed in the ES and supporting appendices. No additional mitigation has been determined necessary at this time and residual effects are considered to be as reported in **Table 9.14**.

## 9.11 Summary

- 9.11.1 **Table 9.14** summarises the preliminary assessment of effects, potential additional mitigation measures and residual effects.

**Table 9.14: Summary of residual effects for hydrology and land drainage**

Description of the Effect	Sensitive Receptor	Significance of Effect with Design Embedded and Good Practice Mitigation	Additional Mitigation Measure	Residual Effect
<b>Construction Phase</b>				
Water Quality and Water Resource Receptors				
Impacts on water resources.	Surface water abstractions/discharges.	<b>Not significant</b> (minor)	None identified in preliminary assessment.	<b>Not significant</b> (minor)
Impact to water quality and hydromorphology by entrainment of loose sediment in runoff from construction activities.	Chellaston Brickworks LNR; Morley Brick SSSI; Oakerthorpe LNR; Williamthorpe LNR; surface water abstractions and drinking water protected zones; River Derwent; River Trent; Cromford Canal; Derby Canal; Trent and Mersey Canal; main rivers and ordinary watercourses.	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Impact to hydromorphology and flow conveyance as a result of increased sediment inputs from watercourse disturbance.	Numerous watercourses.	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Impact to water quality by spillage of pollutants.	Chellaston Brickworks LNR; Morley Brick SSSI; Oakerthorpe LNR; Williamthorpe LNR; surface water abstractions and drinking water protected zones; River Derwent and River Trent;	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)

Description of the Effect	Sensitive Receptor	Significance of Effect with Design Embedded and Good Practice Mitigation	Additional Mitigation Measure	Residual Effect
	Cromford Canal; Derby Canal; Trent and Mersey Canal; main rivers and ordinary watercourses.			
Flood Risk and Land Drainage				
Changes to surface water flood risk due to increase in runoff rates resulting from ground disturbance and creation of impermeable surfaces, and to changes in surface water runoff pathways due to amended ground surface levels.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Changes to watercourse and floodplain flow conveyance arising from the presence of new temporary watercourse crossings, open trench excavations for burying cables and haul roads in the floodplain, increasing the risk of flooding to flood risk receptors.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Changes to flood risk from different sources, including sewers, groundwater, artificial water bodies, reservoirs and land drainage.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)

Description of the Effect	Sensitive Receptor	Significance of Effect with Design Embedded and Good Practice Mitigation	Additional Mitigation Measure	Residual Effect
<b>Operational Phase</b>				
Water Quality and Water Resource Receptors				
Impacts on water resources.	Surface water abstractions/discharges.	<b>Not significant</b> (minor)	None identified in preliminary assessment.	<b>Not significant</b> (minor)
Increased pollution from storage of potential pollutants such as oil-filled transformers.	Williamthorpe LNR; Calow Brook Tributaries.	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Impact to water quality from surface water drainage of new infrastructure.	Calow Brook Tributary 5.	<b>Not significant</b> (minor)	None identified in preliminary assessment.	<b>Not significant</b> (minor)
Impact to geomorphology of the channel from permanent features on the watercourse.	Calow Brook Tributary 5.	<b>Not significant</b> (minor)	None identified in preliminary assessment.	<b>Not significant</b> (minor)
Flood Risk and Land Drainage				
Changes to surface water flood risk due to increase in runoff rates resulting from the creation of impermeable surfaces, due to introduction of new outfall structure, improvements to local highways and to changes in surface water runoff pathways due to amended ground surface levels.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)

Description of the Effect	Sensitive Receptor	Significance of Effect with Design Embedded and Good Practice Mitigation	Additional Mitigation Measure	Residual Effect
Change to fluvial flood risk due to loss of floodplain capacity from concrete plinths on Pylons 4CW141 and 4CW142.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)
Changes to flood risk from different sources, including sewers, artificial water bodies, reservoirs and land drainage.	Flood risk receptors (essential infrastructure to water-compatible land uses).	<b>Not significant</b> (minor to negligible)	None identified in preliminary assessment.	<b>Not significant</b> (minor to negligible)

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