Gate Burton ENERGY PARK

Gate Burton Energy Park Environmental Statement

Volume 1, Chapter 9: Water Environment
Document Reference: EN010131/APP/3.1
January 2023

APFP Regulation 5(2)(a)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Table of Contents

Tables

9. Water Environment

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) relates to the potential effects of the Scheme on surface water bodies (e.g. rivers, streams, ditches, canals, lakes and ponds) including water quality and hydromorphology, flood risk and drainage. This chapter also considers potential effects on hydrogeology, with ground condition issues discussed in **ES Volume 1, Chapter 15: Other Environmental Topics [EN010131/APP/3.1]**. The potential for likely significant effects as a result of the Scheme on the water environment, the proposed mitigation, and how the significance of residual effects are identified.

9.1.2 This chapter is supported by the following figures in **ES Volume 2 [EN010131/APP/3.2]**:

- **Figure 9-1:** Water Resource Features and Attributes;
- **Figure 9-2:** Fluvial Flood Risk;
- **Figure 9-3, 3a, 3b and 3c**: Surface Water Flood Risk;
- **Figure 9-4**: Internal Drainage Board (IDB) watercourses and pumping stations;
- **Figure 9-5:** Groundwater Flood Risk; and
- **Figure 9-6:** Reservoir Flood Risk

9.1.3 This chapter is supported by the following appendices in **ES Volume 3 [EN010131/APP/3.3]**:

- **Appendix 9-A:** Water Framework Directive Assessment;
- **Appendix 9-B:** Legislation and Planning Policy;
- **Appendix 9-C:** Outline Drainage Strategy;
- **Appendix 9-D:** Flood Risk Assessment; and
- **Appendix 9-E:** Summary of Non-Significant Effects.

9.2 Consultation

9.2.1 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in November 2021 as part of the EIA Scoping Process. These Scoping Opinion comments from consultees are documented in **ES Volume 3: Appendix 1-C [EN010131/APP/3.3]** along with responses identifying how these comments have been responded to within the Application.

9.2.2 Further consultation in response to formal pre-application engagement was carried out through the Preliminary Environmental Information (PEI) Report, in June 2022. The feedback received in August 2022 included the following comments:

- Bassetlaw District Council requested addition of reference to Sturton Ward Neighbourhood Plan. In addition, they confirmed it was positive to see the majority of development will be situated in areas of low flood risk and that it does not increase the risk of flooding. The grid connection being via buried cables and proposed mitigation were considered broadly acceptable.

- Environment Agency recommended a series of measures to be incorporated into the development proposals including watercourse easements, sequential location of infrastructure and ensuring flow routes (if present) are not impeded by fencing. Recommendations were also provided for the cabling works including minimum distances of launch and landing areas from flood defences, installation of hazard markers and unused excavated material should be removed from the floodplain.
- Lincolnshire County Council (Lead Local Flood Authority) indicated that the scope set out within the Flood Risk Assessment accompanying the PEIR was generally acceptable. They indicated that any increase in surface water runoff from new impermeable areas needs to be determined and mitigated in accordance with SuDS principles.
- Nottinghamshire County Council (Lead Local Flood Authority) had no comments to make on Flood Risk due to the nature of the proposals within their area or remit (west side of River Trent).
- Trent Valley Internal Drainage Board (IDB) highlighted that there are numerous watercourses which may be impacted and that all IDB watercourses are subject to bylaws intended to protect them and the Boards ability to maintain them.
- West Lindsey District Council noted that the majority of development is located outside areas of known flood risk and the proposed mitigation of sequentially locating infrastructure to areas of low flood risk. Clarity was recommended regarding the cable route being buried and that a drainage strategy will be submitted as part of the DCO application and secured through the DCO process.

9.2.3 A full list of consultation responses in relation to the Water Environment are presented in the **Consultation Report [EN010131/APP/4.1]** submitted as part of the Application.

9.2.4 A request for water resources data (e.g. licensed abstractions, Water Activity Permit locations, pollution incident locations), WFD information and water quality and flow data was requested from the Environment Agency to inform the desk study in March 2022 and followed up subsequently in July 2022. A response had not been received at the time of writing this chapter in January 2023, however, it is considered that sufficient baseline information has been gathered from desk study and site survey to enable a robust assessment to be undertaken.

9.2.5 Additional information regarding the consultation process, and the responses of consultees can be found in **ES Volume 1, Chapter 4: Consultation [EN010131/APP/3.1]**.

9.3 Legislation and Planning Policy

9.3.1 Relevant policy documents are listed below. More detailed information regarding legislation and planning policy can be found in **ES Volume 3: Appendix 9-B [EN010131/APP/3.3]**.

9.3.2 Legislation considered includes:

- Environment Act 2021 (Ref 9-1);
- Water Act 2014 (Ref 9-2);
- Flood and Water Management Act 2010 (Ref 9-3);
- Environmental Protection Act 1990 (Ref 9-4);
- Land Drainage Act 1991 (as amended) (Ref 9-5);
- Water Resources Act 1991 (as amended) (Ref 9-6);
- Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref 9-7);
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 9-8);
- The Environmental Damage (Prevention and Remediation) (England Amendment) Regulations 2017 (as amended) (Ref 9-9);
- Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018) (Ref 9-10);
- Eels (England and Wales) Regulation 2009 (Ref 9-11);
- Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 9-12).
- The Water Resources Act (Amendment) (England and Wales) Regulations 2009 (Ref 9-13);
- The Flood Risk (England and Wales) Regulations 2009 (Ref. 9-14);
- The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (Ref 9-14);
- The Control of Substances Hazardous to Health (Amendment) Regulations 2004 (Ref 9-16);
- The Anti-Pollution Works Regulations 1999 (Ref 9-17); and
- The Water Framework Directive (Standards and Classification) Directions 2015 (Ref 9-18).

9.3.3 National planning policy and guidance considered includes:

- Overarching National Policy Statement for Energy EN-1 (2011) (Ref 9-19);
- National Policy Statement for Renewable Energy Infrastructure EN-3 (2011) (Ref 9-20);
- National Policy Statement for Electricity Networks Infrastructure EN-5 (2011) (Ref 9-21);
- Draft National Policy Statement for Energy EN-1 (2021) (Ref 9-22);
- Draft National Policy Statement for Renewable Energy Infrastructure EN-3 (2021) (Ref 9-23);
- Draft National Policy Statement for Electricity Networks Infrastructure EN-5 (2021) (Ref 9-23);
- National Planning Policy Framework (NPPF) (2021) (Ref 9-25);
- National Planning Practice Guidance (NPPG) (2014) (Ref 9-26), including Flood Risk and Coastal Change;
- The UK Government's 25 Year Environment Plan (Ref 9-27);
- The UK Government's Future Water Strategy (2011) (Ref 9-28);
- Non-statutory technical standards for Sustainable Drainage Systems (Ref 9-29);
- CIRIA Report C753 The SuDS Manual 2nd Edition (2016) (Ref 9-30);
- National Highways (2020) DMRB CD532 Vegetated Drainage Systems for Highways Runoff (Ref 9-31);

- The Building Regulations. Approved Document Part H: Drainage and Waste Disposal (2010) (Ref 9-32); and
- Water UK Sewerage Sector Guidance (2022) (Ref 9-33).

9.3.4 Local planning policy and guidance considered includes:

- Central Lincolnshire Local Plan 2012-2036 (Ref 9-36);
- Bassetlaw District Council Core Strategy and Development Management Policies DPD, adopted 22 December 2011 (Ref 9-37);
- Sturton by Stow and Stow Neighbourhood Plan 2019-2036 (Ref 9-38) and Sturton Ward Neighbourhood Plan (Ref 9-39).
- Draft Bassetlaw Local Plan 2020-2037 (Ref 9-40); and
- Lincolnshire County Council SuDS Guidance (Ref 9-41).

9.4 Assessment Assumptions and Limitations

9.4.1 This assessment is based on baseline data and Scheme design information (see **ES Volume 1, Chapter 2: The Scheme [EN010131/APP/3.1]**) available at the time of writing this ES chapter. An initial assessment of the Solar and Energy Storage Park and the Grid Connection Corridor was undertaken within the PEI Report. Following consultation responses to the PEI Report, that assessment has been developed within this ES chapter while also taking into account further updates to the Scheme design.

9.4.2 A request for water resources data (e.g. licensed abstractions, Water Activity Permit locations, pollution incident locations), WFD information and water quality and flow data was requested from the Environment Agency to inform the desk study in March 2022 and subsequently followed up in July 2022. No data had been received at the time of writing this chapter in January 2023. However, as mentioned above, it is considered that sufficient publicly available baseline information has been gathered from desk study (including Environment Agency online platforms) and site survey to enable a robust assessment to be undertaken.

9.4.3 With regard to the Grid Connection Corridor, it has been confirmed that the River Trent and several of smaller watercourses (those within the allocated avoidance areas) will be crossed using underground techniques (e.g. horizontal directional drilling techniques that would not disturb the watercourse), with the depth of the cable below the bed to be greater than 2m in accordance with Trent Valley IDB requirements.

9.4.4 There are six watercourse crossings that are outside of the avoidance areas could require open cut installation techniques. For these crossings it is assumed that water flow would be maintained during the works by damming and over pumping. These watercourses are generally ephemeral ditches and if works are be carried out in the drier months this would reduce the risk of pollution propagating downstream, although this cannot be guaranteed and thus no weight has been attributed to this in the impact assessment.

9.4.5 The access track for the Grid Connection Corridor is assumed to require culverting of all watercourses that are crossed for cable installation (with the exception of the River Trent) for a five year period as a worst case. The culvert design will aim to minimise changes in alignment and length as much as is feasible. Oversized pipes would be used to allow a naturalised substrate to form. Given that culverts are to be installed for five years, length for length watercourse enhancements have been committed to within the **Outline Design Principles [EN010131/APP/2.3]** in order to provide for overall benefits once the culverts have been removed. As with open cut cable installation, it is assumed that during installation works flow would be maintained during the works by damming and over pumping.

9.4.6 The PV Panels in the Solar and Energy Storage Park will be off set from watercourses and ponds by 10m, as set out in the **Outline Design Principles [[EN010131/APP/2.3],** which will be secured by a requirement of the draft DCO. For all watercourses other than the River Trent this buffer is measured from the centre line of the watercourse as determined from Ordnance Survey mapping. This avoids issues related to determining the watercourse edge in situations where this varies considerably as flow rate changes. This buffer will ensure all construction activities and built development for the installation of PV Panels would be offset from surface watercourses, other than where there is a need for crossing of a watercourse (for cabling installation or possible temporary access) or temporary discharge of treated construction site runoff. Any works to enhance watercourses would require direct works to the channel and banks, although given the aim of these works and their small-scale and 'soft-engineering' nature, construction impacts would be minimal. Overall, the purpose of this buffer reduces the risk of any pollutants entering the watercourse directly, whilst also providing space for mitigation measures (e.g. fabric silt fences) should they be required.

9.4.7 Access tracks will be required across the Solar and Energy Storage Park. These are expected to require 17 watercourse crossings, 10 of which are new crossings and seven are existing culverted crossings. It should be noted that the crossing locations will be fixed at detailed design and so the number required may change. Open span crossings may be used in some instances and the number of crossings required will be reduced where possible. Nonetheless, the assessment presents the worst case of 10 new culverted crossings. Where works are required to the seven existing culverts, this is assumed to be a maximum extension of up to 2m in each case. As with the Grid Connection Corridor access tracks culverts, length for length watercourse enhancement has been committed to within the **Outline Design Principles [EN010131/APP/2.3]** in order to mitigate for culvert installation.

9.4.8 The risk from surface water runoff to surface or groundwater bodies has been assessed qualitatively on the basis of **ES Volume 3, Appendix 9-C: Outline Drainage Strategy [EN010131/APP/3.3].** The Outline Drainage Strategy reflects the Order limits, and is secured through a DCO requirement for detailed surface water drainage design. The risk from surface water runoff from new hard standing to surface or groundwater bodies has been assessed according to the Simple Index Approach presented in the C753 The SuDS Manual (Ref 9-30).

9.4.9 Within the impact assessment, flood risk has been considered in terms of the potential for the Scheme to change existing flood risk (from all sources) and to impact on receptors including existing infrastructure assets, residential buildings, commercial buildings, agricultural land, and property potentially affected by the Scheme.

9.4.10 The FRA and Outline Drainage Strategy have been based on desktop surveys, site walkover and site layout proposals. Where available, topographical data has been used to support the FRA. In the absence of topographical data, LiDAR data has been used to inform the FRA and the Outline Drainage Strategy.

9.4.11 With regard to flood risk, temporary works have not been assessed unless they are of a potentially significant scale and have the potential to adversely affect flood risk or impact the quality or form of water bodies. The temporary works where such risks are considered significant (for example, excavations for the Grid Connection Corridor), will be identified and assessed within the FRA and impact assessment.

9.4.12 During construction it is assumed that an estimated 2,200m^3 of water (1,700m^3 for welfare and 500m^3 for wheel washes) will be required during construction to support welfare facilities onsite and other uses. The water will either be transported to the Order limits by road from an existing nearby licenced water abstraction source and stored on site in tanks of up to 10m^3 capacity (10,000 litres) or connected through a mains connection located on the A156.

9.4.13 Should there be a fire in the BESS Compound, then water would be obtained from a mains connection at the A4156. It has been determined that a supply of 1,900 litres per minute of water would be required. Given that this supply would be for an emergency event for which the probability of occurrence would be low given best practice management of the Scheme, it is assumed that this would not have a significant impact on Anglian Water’s potable water resource. At the time of writing (January 2023), a Point of Connection (PoC) application is being progressed with Anglian Water for this connection and to confirm the availability of supply. Should this approach not be suitable, then tanks of water would be located within the Solar and Energy Storage Park to store the necessary volume needed for firefighting purposes within the BESS Compound.

9.4.14 During operation, there will be welfare facilities associated with the Scheme for up to 14 permanent full time equivalent (FTE) members of staff. Given the low daily occupancy only small volumes of foul drainage will be generated. Wastewater from permanent welfare facilities will consist of a self-contained independent non-mains domestic storage and/or treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor. As there would be no discharge of foul water to a watercourse, and no discharge to the public foul sewer is anticipated, no further assessment of foul waste from the Scheme is proposed. We note that in the Scoping Opinion (see **ES Volume 3: Appendix 1-B [EN010131/APP/3.3]**), the Planning Inspectorate was content to scope this impact out on the basis that foul water would not be connected to a mains foul drainage system.

9.5 Study Area

9.5.1 For the purposes of this assessment, a general study area (Zone of Influence) of approximately 1km from the Order limits has been considered in order to identify water bodies that are hydrologically connected to the Scheme and have the potential to be directly impacted by the activities associated with the Scheme. The study area is shown in **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**.

9.5.2 Given that watercourses flow, water quality and flood risk impacts may propagate downstream, and so water environment assessments will sometimes consider a wider study area which encompass waterbodies whose water quality and quantity may be impacted by the Scheme. However, in this case, watercourses across the study area generally drain to the River Trent, and so this is considered the final receiving waterbody that could conceivably be affected. As such, a 1km study area from the Order limits is considered appropriate.

9.6 Assessment Methodology

9.6.1 This section describes the methodology proposed for the assessment of effects on the water environment, including the criteria for the determination of the significance of the receptor and the magnitude of change from the baseline condition. Potential impacts of the Scheme on the water environment will be assessed by:

- Considering the existing (baseline) status of the water environment within the Scheme and relevant surrounds with respect to flood risk, surface water, groundwater and drainage, following the source-pathway-receptor approach;
- Identifying potential impacts of the Scheme on the water environment during the operational and construction phases including maintenance, as well as cumulative effects. Potential impacts from the decommissioning of the Scheme are similar in nature to those during construction, as some groundwork would be required to remove infrastructure installed. Ducting beneath watercourses is likely to remain in-situ but the cables removed. As such, decommissioning impacts are considered the same as construction as a worst case given implementation of a Decommissioning Environmental Management Plan (DEMP). A **Framework DEMP** accompanies the DCO Application **[EN010131/APP/7.5]**;
- Proposing suitable mitigation measures to be incorporated into the development design, construction, operation and decommissioning to avoid, prevent, minimise or offset any adverse impacts (i.e. embedded and additional mitigation); and
- Reviewing any residual impacts.

Sources of Information

Desktop Research

9.6.2 The water environment baseline conditions have been determined by a desk study of available information, and various other online data sources including:

- Online Ordnance Survey (OS) maps viewed to identify any surface water bodies within 1km of the Scheme as well as general topography and land uses (Ref 9-42);
- Online aerial photography (Ref 9-43);

- Meteorological Office website for general climate information for the study area (Ref 9-44);
- National Rivers Flow Archive website (Ref 9-45);
- Part 1: Anglian River Basin District River Basin Management Plan (Ref 9-34);
- Part 1: Humber River Basin District River Basin Management Plan (Ref 9-35);
- Environment Agency Catchment Data Explorer website (Ref 9-46);
- Environment Agency Water Quality Archive website (Ref 9-47);
- Environment Agency Fish and Ecology Data Viewer (Ref 9-48);
- Defra's Multi-agency Geographical Information for the Countryside (MAGIC) map website (Ref 9-49);
- British Geological Survey (BGS) Geoindex website (Ref 9-50);
- Natural England website for designated sites (Ref 9-51);
- Environment Agency Online Interactive Maps (Flood map for planning (rivers and sea) - Risk of flooding from surface water, Risk of flooding from reservoirs, and Flood warning areas and risk.

9.6.3 In addition, further information and data has been requested directly from the Environment Agency (March 2022) regarding WFD information, water abstractions, discharge consents and pollution incidents. West Lindsey Local Council and Bassetlaw District Council have been contacted regarding Private Water Supplies (PWS). Responses have been received from both councils and taken into account in the assessment when determining potential for the Scheme to impact PWS.

Surveys

9.6.4 An initial site walkover was undertaken on 22 September 2021 in fair weather conditions. The aim of this site visit was to assess watercourse connectivity, quality, and condition. An additional site visit of the Grid Connection Corridor watercourse crossing locations was undertaken on 8 February 2022 in overcast, dry conditions. A further site walkover was undertaken on 17 May 2022.

9.6.5 Water quality surveying has not been undertaken given that the nature of water bodies associated with the Scheme are generally minor. Water quality of the more significant watercourses along the boundary and beyond the Scheme has been determined with reference to background water quality data from routine Environment Agency monitoring.

9.6.6 Further water quality monitoring is not considered necessary given the Environment Agency data that is publicly available, and that importance of water bodies will be determined from a holistic review of water body features and does not rely on water quality due to the principle that no controlled water may be polluted. Water quality impacts have been assessed based on a risk assessment that does not require input of raw background water quality data (described further below). The approach has been agreed with PINS.

Source-Pathway-Receptor Approach

9.6.7 Based on professional judgement and experience of other similar schemes, a qualitative assessment of the likely significant effects on surface water quality and water resources has been undertaken.

9.6.8 The predominantly qualitative assessment of the likely significant effects has considered the construction, operation, and decommissioning phases, as well as cumulative effects with other developments. It is based on a source-pathway-receptor approach. For an impact on the water environment to exist the following is required:

- An impact **source** (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a water body);
- A **receptor** that is sensitive to that impact (i.e. water bodies and the services they support); and
- A **pathway** by which the two are linked.

9.6.9 The first stage in applying the Source-Pathway-Receptor model is to identify the causes or ‘sources’ of potential impact from a development. The sources are identified through a review of the details of the Scheme, including the size and nature of the development, potential construction methodologies and timescales.

9.6.10 The next step in the model is to undertake a review of the potential receptors, that is, the water environment receptors that have the potential to be affected. Water bodies including their attributes have been identified through desk study and site surveys.

9.6.11 The last stage of the model is, therefore, to determine if there is a viable exposure pathway or a ‘mechanism’ linking the source to the receptor. This is undertaken in the context of local conditions relative to the water receptors within the study area, such as topography, geology, climatic conditions and the nature of the impact (e.g. the mobility of a liquid pollutant or the proximity to works that may physically impact a water body).

9.6.12 To support the assessment some sub-topic specific assessments have been undertaken. These are described in more detail in the following sections.

Drainage Strategy

9.6.13 An Outline Drainage Strategy has been prepared to support the DCO application (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) and will be secured as a requirement of the DCO. The drainage strategy comprises a concept design of the system, proposing above ground conveyance and attenuation features, to mimic the natural flow regime as far as practicable whilst reducing flood risk.

Assessment of Surface Water Runoff for the Operational Phase

9.6.14 During operation, surface water runoff from the Scheme may contain pollutants derived from impermeable surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as ‘urban diffuse pollutants,’ and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts to surface water or groundwater. Changes in impermeable surfaced area within the Order limits may lead to increases in the rate and quantities of these pollutants being runoff to receiving watercourses. An assessment is therefore undertaken to determine the potential risk to the receiving waterbodies and to inform the development of suitable treatment measures.

9.6.15 The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants has been assessed with reference to the Simple Index Assessment method described in the SuDS Manual (Ref 9-30). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);
- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants - total suspended solids, heavy metals and hydrocarbons). Only 50% efficiency should be applied to second, third etc. treatment train components; and
- Step 3 – If the discharge is to a water body protected for drinking water, consider a more precautionary approach.

9.6.16 The SuDS Manual (Ref 9-30) only provides a limited number of land use types and so those selected will be the most suitable for the components of the Scheme, based on professional judgement. Where more than one pollution hazard category applies to a component of the Scheme, the worst pollution hazard will be selected.

Hydromorphological Assessment

9.6.17 Potential hydromorphological impacts have been qualitatively appraised based on a desk study, a site walkover and a review of the Scheme components that may affect the physical form of water bodies.

9.6.18 Consideration has been given to how the Scheme is likely to impact upon the WFD objectives for the relevant watercourses within **ES Volume 3: Appendix 9-A [EN010131/APP/3.3].** Within the ES, morphological effects are described according to the method for determining effect significance as described below.

Flood Risk Assessment

9.6.19 A site-specific FRA has been prepared for the Order limits (see **ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**). This has been prepared in accordance with the requirements of the NPPF and accompanying guidance and relevant regional and local policy and guidance. It includes a review of the current and future flood risk to the Site from all sources (including fluvial, tidal, surface water, groundwater, sewer and artificial sources), to inform the Scheme design and set out proposed mitigation requirements including reference to the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3])**.

9.6.20 The majority of the development is located outside of areas with a risk of flooding. Where development is proposed in areas susceptible to flooding there may be a requirement for mitigation measures to ensure no detrimental effect to flooding potential within or from the affected watercourse in the catchment once the Scheme is operational.

Water Framework Directive Assessment

9.6.21 Proposed schemes having the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected water bodies. As part of its role, the Environment Agency must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a water body from its current status or potential; and/or
- Prevent future attainment of Good status (or potential where not already achieved).

9.6.22 The following guidance on how to undertake WFD assessments will be used to inform this assessment:

- Environment Agency Advice Note - Water Framework Directive Risk Assessment: How to assess the risk of your activity' (Ref 9-52); and
- The Planning Inspectorate Advice Note 18: The Water Framework Directive' (Ref 9-53).

9.6.23 The assessment has been undertaken in three stages. The first stage is 'screening', the aim of which is to identify the Scheme components that could affect WFD status and 'screen out' aspects of the project that do not require any further consideration. The second stage is 'scoping', whereby WFD receptors that are potentially at risk are identified and it is determined how the risk will be assessed. Finally, and if required, stage 3 involves a full impact assessment, including where necessary consideration of the criteria for derogation if required as outlined in Regulation 19 of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

9.6.24 **ES Volume 3: Appendix 9-A [EN010131/APP/3.3]** presents the full WFD assessment for the Scheme (Stages 1-3 as appropriate).

Matters Scoped Out of the Assessment

9.6.25 With regards to potable water supply, the study area is supplied by Anglian Water. All water companies are required by the Government to produce a Water Resources Management Plan (WRMP) to show how they plan to maintain a secure supply of water to all their customers over the next 25 years (Ref 9-54).

9.6.26 During construction, based on an assumed 20 litres/day, an estimated 2,200m^3 total (1,700 m^3 for welfare and 500 m^3 for wheel washes) of water will be required to support welfare facilities onsite and other uses. The water will either be transported to the Order limits by road from an existing nearby licensed water abstraction source and stored on site in tanks of up to 10m^3 (10,000 litres) capacity or connected through a mains connection.

9.6.27 The Scheme will contain solar PV technology and no residential usage of water required in the long term, with water demand only required to provide for an estimated 14 operational workers. This will have a very minor impact on local potable mains water supplies.

9.6.28 Should there be a fire in the BESS Compound, then water would be obtained from a mains connection at the A156. It has been determined that a supply of 1,900 litres per minute of water would be required. At the time of writing

(January 2023), a Point of Connection (PoC) application is being progressed with Anglian Water who will confirm the availability of supply. Should this approach not be suitable, then tanks of water would be located within the Solar and Energy Storage Park to store the necessary volume needed for firefighting purposes within the BESS Compound.

9.6.29 Given the above, an assessment of potential impact on public potable water has not been scoped in for further consideration.

9.6.30 Wastewater from permanent welfare facilities will consist of a self-contained independent non-mains domestic storage and/or treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor. As there would be no discharge of foul water to a watercourse, and no discharge to the public foul sewer is anticipated, the assessment of foul water drainage has been scoped out.

Significance Criteria

9.6.31 As outlined in **ES Volume 1, Chapter 5: EIA Methodology [EN010131/APP/3.1]**, the evaluation of the significance of an effect is important; it is the significance that determines the resources that should be deployed in avoiding or mitigating a significant adverse effect, or conversely, the actual value of a beneficial effect.

9.6.32 The significance of effects for the water environment will be determined using the principles of the guidance and criteria set out in the Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment (Ref 9-55) and DMRB LA104 Environmental Assessment and Monitoring (Ref 9-56) adapted for this assessment to take account of hydromorphology. Although these assessment criteria were developed for road infrastructure projects, this method is suitable for use on any development project and it provides a robust and well tested method for predicting the significance of effects. The methodology also considers advice set out in Department of Transport TAG Unit A3, Environmental Impact Appraisal (Ref 9-57). The criteria that will be used to determine receptors importance is presented in Table 9-1.

9.6.33 Whilst other disciplines may consider ‘receptor sensitivity’, ‘receptor importance’ is considered here. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a water body. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes is very sensitive to impacts, whereas an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in England are protected by law from being polluted.

9.6.34 In accordance with the stages of the methodology, there are three stages to the assessment of effects on the water environment, which are as follows:

- A level of importance (low to very high) is assigned to the water resource receptor based on a combination of attributes as outlined in Table 9-1 (such as the size of the watercourses, the spatial extent of importance (e.g. habitat protected by international law), WFD designations, water supply and other uses, biodiversity, and recreation etc.) and on receptors to flood risk based on the vulnerability of the receptor to flooding;
- The magnitude of potential and residual impact (classed as negligible, minor, moderate or major adverse / beneficial) is determined based on the criteria listed in Table 9-2 and the assessor's professional judgement and the likelihood of the effect occurring. The likelihood of an effect occurring is based on a scale of certain, likely, or unlikely. Likelihood has been considered in the case of water resources only, as likelihood is inherently included within the FRA; and
- A comparison of the importance of the resource and magnitude of the impact (for both potential and residual impacts) results in an assessment of the overall significance of the effect on the receptor using the matrix presented in Table 9-3. The significance of each identified effect (both potential and residual) is classed as very large, large, moderate, slight or neutral and either beneficial or adverse significance.

9.6.35 The following significance categories have been used for both potential and residual effects:

- **Negligible**: An imperceptible effect or no effect to a water resource receptor;
- **Beneficial**: A beneficial / positive effect on the quality of a water resource receptor; or
- **Adverse**: A detrimental / negative effect on the quality of a water resources receptor.

9.6.36 In the context of this assessment, an effect can be temporary or permanent, with effects quantified temporally as being short-term (0-5 years), medium term (6-10 years) and long-term (>10 years).

9.6.37 At a spatial level, ‘local’ effects are those affecting the Scheme within the Order limits and neighbouring receptors within the study area, while effects upon receptors beyond the vicinity of the study area are considered to be at a ‘regional’ level. Effects which affect different parts of the country, or England as a whole, are considered being at a ‘national’ level. Spatial importance is built into the criteria for determining importance as outlined in Table 9-1 and is therefore taken into account in the process of determination significance of effects.

9.6.38 The importance of the receptor (Table 9-1) and the magnitude of impact (Table 9-2) are determined independently from each other and are then used to determine the overall significance of effects (Table 9-3). Options for mitigation will be considered and secured where possible to avoid, minimise and reduce adverse impacts, particularly where significant effects may have otherwise occurred. The residual effects of the Scheme with identified mitigation in place will then be reported. Effects designated as moderate, large, or very large are considered significant.

Table 9-1: Criteria to Determine Receptor Importance (adapted from DMRB LA113, Ref 9-55)

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[1]	Flood Risk
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.	EC Designated Salmonid / Cyprinid fishery; Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m^3/s; site protected / designated under EC or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site, Species protected by EC legislation. Critical social or economic uses (e.g. public water supply and navigation).	Source Protection Zone (SPZ) 1; Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation; Groundwater locally supports GWDTE; Water abstraction: >1,000 m^3/day	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.	Floodplain or defence protecting more than 100 residential properties from flooding; Flood Zone 3a and/or 3b; Essential Infrastructure or highly vulnerable development. Very high risk from non-fluvial flood sources.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 < 1.0 m^3/s; Major Cyprinid Fishery; Species protected under EC or UK habitat legislation. Critical social or economic uses (e.g. water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.	Principal Aquifer providing locally important source supporting rover ecosystem; SPZ2; Groundwater supports GWDTE; Water abstraction: 500-1,000m^3/day.	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.	Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding; Flood Zone 2; More vulnerable development. High risk from non-fluvial flood sources.
Medium	The receptor has moderate capacity to absorb change	Watercourses not having a WFD classification shown in a RBMP	Secondary Aquifer providing water for	Shows signs of previous alteration and/or minor	Floodplain or defence protecting 10 or fewer

[1] Based on the water body 'Reach Conservation Status' presently being adopted for a major infrastructure project (and developed originally by Atkins) and developed from EA conservation status guidance (Ref 9-58, Ref 9-59) as LA113 (Ref 9-55) does not provide any criteria for morphology.

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[1]	Flood Risk
	without significantly altering its present character, has some environmental value or is of regional importance.	and Q95 >0.001m^3/s. May be designated as a local wildlife site (LWS) and support a small / limited population of protected species. Limited social or economic uses.	agricultural or industrial use with limited connection to surface water SPZ 3; Water abstraction: 50-499 m^3/day.	flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	industrial properties from flooding; Flood Zone 2; Less vulnerable development. Medium risk from non-fluvial flood sources.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/s. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.	Generally Unproductive strata. Water abstraction: <50m^3/day	Substantially modified by past land use, previous engineering works or flow / water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelized with hard bank protection or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.	Floodplain with limited constraints and low probability of flooding of residential and industrial properties; Flood Zone 1; Water compatible development. Low risk from non-fluvial flood sources.

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[1]	Flood Risk
Negligible	The receptor is resistant to change and is of little environmental value	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Table 9-2: Magnitude of Impact Criteria (adapted from DMRB LA 113, Ref 9-55)

Magnitude of Impact	Description	Examples
Major Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute.	Surface water: Loss or extensive change to a fishery. Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification. Groundwater: Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive change to groundwater dependent terrestrial ecosystem (GWDTE) or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification. Loss or significant damage to major structures through subsidence or similar effects. Flood Risk: Increase in peak flood level >100 mm.
Moderate Adverse	Results in impact on integrity of attribute, or loss of part of attribute.	Surface water: Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification Groundwater: Partial loss or change to an aquifer. Degradation or regionally important public water supply or loss of significant commercial/industrial/agricultural supplies. Partial loss of the integrity of GWDTE. Contribution to reduction in water body WFD classification. Damage to major structures through subsidence or similar effects or loss of minor structures. Flood Risk: Increase in peak flood level > 50mm
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability.	Surface water: Minor effects on water supplies. Groundwater: Minor effects on an aquifer, GWDTEs, abstractions and structures. Flood Risk: Increase in peak flood level >10mm
Negligible	Results in impact on attribute, but of insufficient	Surface / Groundwater: The proposed project is unlikely to affect the integrity of the water environment.

Magnitude of Impact	Description	Examples
	magnitude to affect the use or integrity.	Flood Risk: Negligible change to peak flood level (≤ +/- 10mm).
Minor Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring.	Surface Water: Contribution to minor improvement in water quality, but insufficient to raise WFD classification. Groundwater: Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding. Flood Risk: Creation of flood storage and decrease in peak flood level (>10 mm).
Moderate beneficial	Results in moderate improvement of attribute quality.	Surface Water: Contribution to improvement in waterbody WFD classification. Groundwater: Contribution to improvement in water body WFD classification. Improvement in water body catchment abstraction management strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE. Flood Risk: Creation of flood storage and decrease in peak flood level (>50 mm).
Major beneficial	Results in major improvement of attribute quality	Surface Water: Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in water body WFD classification. Groundwater: Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body WFD classification. Flood Risk: Creation of flood storage and decrease in peak flood level (>100 mm).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.	

Table 9-3: Matrix for Assessment of Significance (adapted from DMRB LA 104, Ref 9-56)

Importance of Receptor	Magnitude of Impact				
	Major	**Moderate**	**Minor**	**Negligible**	**No change**
Very High	Very Large	Large or Very Large	Moderate or Large	Slight	Neutral

Importance of Receptor	Magnitude of Impact				
High	Large or Very Large	Moderate or Large	Slight or Moderate	Slight	Neutral
Medium	Moderate or Large	Moderate	Slight	Neutral or Slight	Neutral
Low	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight	Neutral
Negligible	Slight	Neutral or Slight	Neutral or Slight	Neutral	Neutral

9.7 Baseline Conditions

Existing Baseline

9.7.1 This section provides a description of the current Scheme baseline and identifies the sensitive receptors and their individual importance (value).

9.7.2 Where relevant, waterbodies and their attributes have been presented in a series of figures **[EN010131/APP/3.2]** that support this chapter. **ES Volume 2: Figure 9-1** presents surface and groundwater bodies and related water resource information and attributes; **ES Volume 2: Figure 9-2** shows Environment Agency Flood Zones; **ES Volume 2: Figure 9-3** shows Surface Water Flood Risk and **ES Volume 2: Figure 9-4** shows IDB watercourses and pumping station locations; **ES Volume 2: Figure 9-5** shows Groundwater Flood Risk; and **ES Volume 2: Figure 9-6** shows Reservoir Flood Risk.

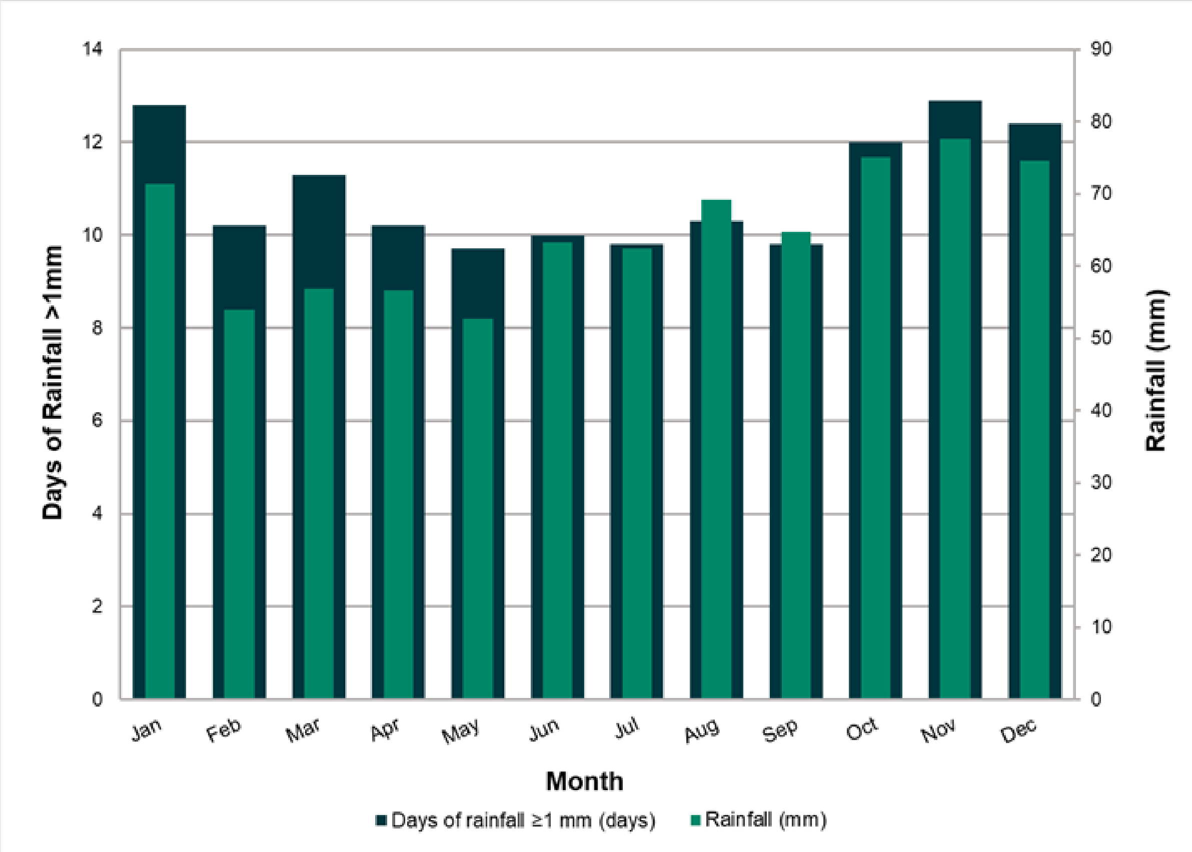
Topography, Climate and Land Use

9.7.3 The topography of the study area is generally flat. The elevation ranges from 30m above ordnance datum (AOD) to <10m AOD (Ref 9-42). The topographical highs (~30m AOD) are found within the north of the study area (north of Knaith Park) and the topographical lows are associated with the River Trent waterbody and its floodplain, resulting in a gentle slope from north-east to south-west across the Order limits. Land rises very gently away from the River Trent on its western bank along the Grid Connection Corridor, with the majority of the study area on this western side of the river being <10m AOD.

9.7.4 The land use within the study area is generally a mosaic of arable farmland, with patches of woodland, drains and ponds scattered across the area. The River Trent bisects the study area, with the Solar and Energy Storage Park located east of this river. There is a large, decommissioned power station (Cottam Power Station) adjacent to the southern extent of the Grid Connection Corridor, next to Cottam Substation, which is the proposed connection point to the National Grid. The study area also includes several small villages such as Gate Burton, Marton, Willingham by Stow, Cottam and Knaith Park. The A156 (Gainsborough Road) runs almost parallel to the River Trent waterbody through the study area and a section between Marton and Knaith is within the Order limits. A railway line passes across the Solar and Energy Storage Park in an approximately north-south orientation. Lincoln Golf Course lies within the study area to the south east of the Order limits.

9.7.5 The nearest Met Office weather monitoring station is Scampton which is located approximately 12km to the south-east of the Order limits (Ref 9-44). Based on the available data from this weather station (1981–2010), it is estimated that the study area is likely to receive an average of 613.2mm of rainfall per year, with it raining (greater or equal to 1mm of rain) on approximately 115.6 days per year. This suggests that rainfall in the area is low and can be considered below average for rainfall in the United Kingdom. Rainfall is highest from mid-autumn to mid-spring and generally peaks in November, with the least rainfall falling in May on average (see Graph 9-1).

9.7.6 The same weather station reports that the area generally gets around 54.8 days of air frost a year, distributed across all months except July and August, whereas the majority (11.7 days) occurs across February.



Graph 9-1 Scampton weather station: monthly rainfall and days of rainfall >1 mm (Ref 9-44).

Geology, Groundwater and Soils

9.7.7 The Order limits is primarily underlain by three bedrock geologies which are all mudstone formations (Ref 9-50). These include:

- Scunthorpe Mudstone Formation - mudstone and limestone, interbedded;
- Penarth Group – mudstone; and
- Mercia Mudstone Group – mudstone.

9.7.8 The Solar and Energy Storage Park is primarily underlain by the Scunthorpe Mudstone Formation, with a narrow band of Penarth Group immediately west of the A156. East of the A156 is Mercia Mudstone Group, and this extends across the entire study area west of the River Trent and underlies the Grid Connection Corridor.

9.7.9 The superficial deposits are generally of limited extent across the study area. The floodplain of the River Trent comprises alluvium (clay, silt sand and gravel). The Grid Connection Corridor is also underlain in part by limited outcrops of Holme Pierrepont Sand and Gravel Member. There are also some limited outcrops of till (diamicton) close to Rampton. The centre of the study area is primarily covered by the Holme Pierrepoint Sand and Gravel Member, while the Solar and Energy Storage Park is underlain by limited outcrops of Mid-Pleistocene glaciofluvial deposits (sand and gravel), alluvium and till (in a small part of the southern boundary of the Solar and Energy Storage Park adjacent to the railway). However, much of the Solar and Energy Storage Park has no recorded superficial deposits.

9.7.10 There are small outcrops of peat present between Marton and Torksey but these are not extensive. They will provide some groundwater storage to slowly leak into local watercourses. However, the peat overlies a sand and gravel aquifer, which is considered to be providing almost all of the baseflow to the streams. The peat deposits are not spatially extensive and the Grid Connection Corridor does not cross the mapped peat deposits. As such, there is considered no potential to impact on these peat deposits and they are not considered further.

9.7.11 The bedrock beneath the Solar and Energy Storage Park and Grid Connection Corridor is generally classified as a Secondary B aquifer (Ref 9-49). Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers. There is a thin area of Secondary (undifferentiated) aquifer, which is associated with the Penarth Group mudstone. Secondary (undifferentiated) aquifer is where it is not possible to apply either a Secondary A or B definition. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. The patchy superficial deposits within the study area are Secondary A aquifers, with the exception of till deposits which are Secondary (undifferentiated) aquifer. Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

9.7.12 There are numerous borehole scans available online on the BGS Geoindex website (Ref 9-50) across the study area, some of which include groundwater depths. An indication of some of the depths are as follows:

- Kexby (reference SK88NE6, NGR SK 87190 86080, 1973) – water 1.9m below ground level (bgl) – northeast of the study area;
- Willingham-by-Stow (reference SK88SE27, NGR SK 87444 84567, 2003) – water 1.2m bgl – east of the study area;
- Broom Hills, Knaith (reference SK88SW19 NGR SK 84040 84330, 1971), no water struck in a 6m borehole – within the Solar and Energy Storage Park, south of Knaith Park;
- Central Park Farm, Knaith (reference SK88SW18, SK 83290 84400, 1971) – no water struck in a 4.2m borehole – within the Solar and Energy Storage Park, south of Knaith Park;

- Marton village (reference SK88SW1, NGR SK 83857 82191, 1933) – water had a rest level 4.7m bgl – in the study area, west of the Order limits at Marton;
- Spafford Close, Marton (reference SK88SW58, NGR SK 84400 81750, 2002) – groundwater seepages at 1.9 m bgl – within the study area, west of Order limits at Stow Park Road;
- West Burton / Waltham Cross (reference SK88SW26, NGR SK 83653 80957, 1968) – groundwater 7.01 m bgl – within the Grid Connection Corridor;
- Cottam, (reference SK88SW17, NGR SK 81690 80280, 1971) – groundwater 2.3m bgl – immediately adjacent to the Grid Connection Corridor; and
- Cottam, Wymondley Power Line (reference SK87NW109, NGR SK 81708 78631, 1967) – water encountered from 3.96m bgl, within the Grid Connection Corridor, south of Cottam Power Station.

9.7.13 The study area falls within two WFD groundwater bodies (Ref 9-46). The far north and east extents of the study area fall within the Witham Lias groundwater body (GB40502G401400) within the Anglian RBMP, while the remainder of the Scheme is covered by the Lower Trent Erewash – Secondary Combined groundwater body (GB40402G990300) within the Humber RBMP (see **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**).

9.7.14 The Witham Lias groundwater body (WFD ID: GB40502G401400) covers a total area of 683.57 km^2 and under the WFD Cycle 3 classifications (2019), was classified as being at Good Status, overall, quantitatively and chemically. The Lower Trent Erewash – Secondary Combined groundwater body (WFD ID: GB40402G990300) covers a total area of 1924.4 km^2 and during 2019 Cycle 3, was given Good Status, overall, quantitatively and chemically (Ref 9-46).

9.7.15 The Soilscape map viewer (Ref 9-60) describes the soils beneath the Solar and Energy Storage Park area of the Scheme as '*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*'. These have moderate fertility and are most at risk from overland flow from compacted or poached fields. East and south of Marton there is an area of '*Naturally wet very acid sandy and loamy soils*'. Where cropped this soil is vulnerable to leaching of nitrate and pesticides to groundwater, and is vulnerable to wind erosion in dry weather. There is also a small patch of '*Lime-rich loamy and clayey soils with impeded drainage*' south of Marton. The floodplain of the River Trent is underlain by '*Loamy and clayey floodplain soils with naturally high groundwater*' which has moderate fertility and is most at risk from pollution from floodwater scouring. This spans much of the Grid Connection Corridor, along with another band of '*Naturally wet very acid sandy and loamy soils*' around the Cottam Power Station and substation.

Surface Water Bodies

9.7.16 The Order limits is located between the Witham Management Catchment within the Anglian RBMP (Ref 9-34) and the Lower Trent and Erewash Management Catchment within the Humber RBMP (Ref 9-35). There are six WFD surface waterbody catchments within the study area. These are:

- Trent from Carlton-on-Trent to Laughton Drain (WFD ID: GB104028058480) – Main River;

- River Till (WFD ID: GB105030062411 – Main River;
- Tributary of the Till (WFD ID: GB105030062480) – Upper Witham IDB watercourse, known as Carr Drain;
- Marton Drain Catchment (Trib of Trent) (WFD ID: GB104028057840) – Trent Valley IDB watercourse;
- Seymour Drain Catchment (Trib of Trent) (WFD ID: GB104028058340) – Trent Valley IDB watercourse; and
- Skellingthorpe Main Drain waterbody (WFD ID: GB105030062390) – Ordinary Watercourse.

9.7.17 Further details for each of these waterbodies is given in Table 9-4. Refer to **ES Volume 2: Figure 9-1** for locations and **ES Volume 2: Figure 9-4 [EN010131/APP/3.2]** which shows IDB watercourses.

Table 9-4: WFD Surface Waterbodies in the Study Area

<table>
<tr><th>Waterbody</th><th>Ecological Status / Potential</th><th>Chemical Status</th><th>Overall Target Objective</th><th>Hydromorphological Designation</th><th>Designated Reach</th><th>Reasons for Not Achieving Good Status</th></tr>
<tr><td>Trent from Carlton-on-Trent to Laughton waterbody (GB104028058480)</td><td>Moderate Ecological Potential (note that Biological Status is Bad due to a Bad classification for invertebrates)</td><td>Fail</td><td>Good (2027)</td><td>Artificial</td><td>The designation extends from the town of Carlton-on-Trent (approximately 18km south of Gate Burton as the crow flies) from where it flows predominantly north-north east for 58.6km to Laughton where the waterbody is then designated as the ‘Humber Upper’ WFD waterbody. The catchment has an area of 153 km^2.</td><td>Physical modifications relating to navigation and agriculture, continuous sewage discharges, diffuse agricultural pollution, poor soil management in the catchment and transport drainage</td></tr>
<tr><td colspan="7"> Relation to Scheme: The River Trent is located to the west of the Solar and Energy Storage Park but would be crossed by the Grid Connection Corridor to Cottam Substation at approximate NGR SK 83123 80990 (see ES Volume 2: Figure 9-1 [EN010131/APP/3.2]).
Site Observations: The River Trent was observed between Cottam and Littleborough during the site visit, where it flows from south to north and is approximately 90m wide. The watercourse is tidal with the National Tidal Limit (NTL) being approximately 28km upstream of the Order limits. The river occupies an expansive floodplain which is flanked by successions of terrace deposits that indicate the river’s former dynamic character. However, the Trent has a long history of anthropogenic modification, resulting in a single-thread, passively meandering and morphologically homogenous river that is disconnected from its floodplain by extensive embankments. Flow within the channel was noted to be uniform and laminar, owing to the over-deep form maintained by artificial confinement; with no apparent hydraulic variance present. It was not possible to view the substrate character of the channel during the site visit; however, it is assumed to consist of fine gravels, sands and silts (the latter of which is derived predominantly from catchment-wide intensive agriculture and urbanisation). The adjacent riparian zone is severely depleted with only a thin yet fragmented strip adjoining the channel. However, the aforementioned embankments, which are maintained for the purposes of flood management, limit potential for development of a high-functioning riparian zone.
The river is used for navigation and is managed by the Canal and River Trust within the study area. The nearest moorings indicated on the Canal and River Trust website (Ref 9-61) are at the confluence of the Fossdyke Canal and River Trent at Torksey Lock, approximately 2.5km upstream of the Order limits. There are 55 leisure berths at this mooring facility. The Torksey Yacht Club is also based at this location. There is also a fishery of 365m length on the left bank of the River Trent, within the study area, immediately north of the Order limits at the River Trent crossing for the Grid Connection Corridor (Ref 9-61).
Further details regarding hydrology, tides and water quality are provided later in the baseline (see River Trent – Hydrology and Tidal Cycle and Water Quality subsections below). </td></tr>
<tr><td>River Till waterbody (GB105030062411)</td><td>Moderate Ecological Potential (on the basis of Moderate physico-</td><td>Fail</td><td>Moderate (2015)</td><td>Heavily Modified</td><td>The watercourse designation extends from where it rises to the south of Gainsborough east of</td><td>Trade/industry discharges, sewage discharge (continuous) and poor</td></tr>
</table>

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach	Reasons for Not Achieving Good Status
	chemical quality elements, notably phosphates which are at Poor status)				Warren Wood and continues east and south past Upton, Kexby and Willingham-on-Stow, to its confluence with the Fossdyke Navigation near Saxilby. The watercourse is 25.1km length and drains an area of around 86km^2.	nutrient management from agriculture.
Relation to Scheme: The River Till is located at the eastern extent of the study area, and would not be directly impacted by the Scheme. However, it is hydrologically connected to the Scheme via the 'Tributary of the Till' WFD waterbody. The Tributary of the Till's confluence with the River Till is 1.4 km downstream of the Order limits (see **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**).						
Site Observations: This watercourse was not observed given that there would be no direct physical impact to it.						
Tributary of the Till waterbody (GB105030062480)	Poor Ecological Status (on the basis of Poor macrophytes and phytobenthos combined)	Fail	Moderate (2027)	Not Artificial or Heavily Modified	Designated from its source east of the Solar and Energy Storage Park, just north of Kexby Lane, and continues south along the eastern margin of the Scheme (Solar and Energy Storage Park), and then continues south to meet the River Till at Tilby Dale. The watercourse is 4.9km length and drains an area of around 17.1km^2.	Diffuse pollution from poor soil management and physical modification relating to land drainage
Relation to Scheme: The Tributary of the Till forms the eastern extent of the Scheme boundary for approximately 1km to the west of Willingham by Stow. It also has tributaries (drains) that extend into the Scheme boundary (see **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**).						
Site Observations: This watercourse was observed between Marton Road and Park Farm and is agricultural in character. It is highly modified, with extensive straightened sections with signs of recent dredging. The channel is trapezoidal with steep incised banks and the wetted width was approximately 1m at the time of the visit. It is conveyed beneath Marton Road through a box culvert of approximately 1.5m width. Flow is impounded upstream of the culvert to create a pool with a water depth at the time of the walkover of around 30cm. Arable agriculture extends to the channel margins on both banks in this stretch with no riparian buffer, and so would be expected to suffer from agricultural pollution. The watercourse was covered in extensive duck weed and *Calamagrostis* spp. grasses. Bed substrate, where visible, was dominated by fine sediments. Water was generally standing in pools at the time of the site visit (low flow conditions) with no observable flow.						

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach	Reasons for Not Achieving Good Status
Marton Drain Catchment (tributary of Trent) waterbody (GB104028057840)	Moderate Ecological Status (on the basis of dissolved oxygen which is at Moderate status)	Fail	Good (2027)	Heavily Modified	The watercourse is designated from Torksey Village Green and flows north to meet the River Trent west of Marton. It is 3.14km in length and drains a total area of 5.04 km^2.	Physical modifications, sewage discharge pollution and poor livestock management
Relation to Scheme: Marton Drain would be crossed by the Grid Connection Corridor at approximate NGR SK 83680 81181.						
Site Observations: Marton Drain was visited at its crossing of the A156 south of Marton. It has a straightened, trapezoidal channel and was approximately 5m in width. It has steep incised banks rising approximately 5m from the bed on the left bank, and 3m on the right bank. At the time of the site visit the water within the channel was extremely turbid and so the depth could not be ascertained. The margins showed extensive fine sediment deposition and a brown scum indicative of poor water quality. There was rough grassland on the left bank for approximately 5m to provide a buffer from the adjacent arable field. No macrophytes were observed at the time of the site visit.						
Seymour Drain Catchment (tributary of Trent) (GB104028058340)	Moderate Ecological Potential	Fail	Good (2027)	Heavily Modified	The watercourse rises in an agricultural region, south of the village of Rampton where it flows in a step-like fashion in a north easterly direction for 6.5km before reaching the confluence with Trent from Carlton-on-Trent to Laughton waterbody (River Trent). It is 6.5 km in length and drains a catchment of 19.6km^2.	Physical modifications, sewage discharge pollution, poor soil management and transport drainage
Relation to Scheme: Seymour Drain would be crossed by the Grid Connection Corridor at approximate NGR SK 82077 80752.						
Site Observations: Seymour Drain to the south of the Cottam Power station is a straightened, and artificial channel. It is approximately 1.5m wide, with banks rising 2-3m from the bed. Water depth at the time of the site visit was approximately 0.3m. Along the left bank there is deciduous hedgerow vegetation which will provide a degree of shading and a buffer from the adjacent arable fields. The left bank lacks any riparian vegetation between the channel and the adjacent field. The bed is dominated by fine sediment and there were no macrophytes present in the watercourse at this point. The watercourse flows along Torksey Ferry Road, under which it is then culverted before entering another culvert beneath the Cottam Power Station. The watercourse was also visited off Headstead Bank, downstream of the Cottam Power Station. Here it exhibited a small degree of sinuosity, albeit in a sharply defined and over deep channel. The channel width was approximately 4m wide at this point, with banks rising 3m from the bed. Depth was around 0.5m. There is no significant riparian vegetation to provide a buffer from the adjacent fields. The water is relatively clear and noticeably less turbid compared to adjacent watercourses surveyed although the bed is dominated by fine sediment, and there were some submerged macrophytes present.						

Gate Burton ENERGY PARK

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach	Reasons for Not Achieving Good Status
Skellingthorpe Main Drain (GB105030062390)	Moderate Ecological Potential	Fail	Moderate (2015)	Heavily Modified	The designated waterbody rises south of Broadholme and flows southeast to meet the River Witham in Lincoln. It is 10.2km in length and drains a large catchment of 98.3km^2. It is this wider catchment that extends into the study area for the Scheme.	Contaminated land, sewage discharge pollution, land drainage and urbanisation.

Relation to Scheme: The Skellingthorpe Main Drain is approximately 10km south of the Order limits and flows south-east from near Saxilby towards Lincoln. However, its WFD catchment covers much of the Solar and Energy Storage Park and there may be hydrological connectivity to the watercourse via the drains and tributaries that extend into the Solar and Energy Storage Park.

Site Observations: Given that there would be no direct physical impact to this waterbody and that it is approximately 10km south of the Order limits it was not visited during the walkover.

9.7.18 In addition to the WFD watercourses, there are several undesignated tributaries of these waterbodies present within the study area, along with drains, ditches and ponds. Named watercourses that have been identified on the basis of Ordnance Survey mapping (Ref 9-42) are listed in Table 9-5.

Table 9-5: Named watercourses in the study area

Waterbody	Relevant WFD Catchment	Watercourse Description	Site Observations
Padmoor Drain	Upstream tributary of the 'Tributary of the Till' (Carr Drain)	This watercourse rises adjacent to Thurlby Wood (northeast of Knaith Park) immediately north of the study area and flows in a south-south-easterly direction through the study area for 1.4km before being WFD designated as 'Tributary of Till' from in between Kexby Lane and Padmoor Lane. This is an Upper Witham IDB watercourse. It does not cross into the Order limits and is upstream of the Scheme.	The watercourse was observed from Padmoor Lane. Here it was a straight, artificial, trapezoidal channel of around 1.5m width. The bed was dominated by fine sediment. The channel has step, incised banks rising up to 2m from the bed. Off Padmoor Lane the eastern bank had little riparian buffer to the adjacent arable agricultural land but hedgerow vegetation was found along the western bank.
Causeway Drain	Upstream tributary of the 'Tributary of the Till' (Carr Drain)	This watercourse is located adjacent to Kexby Lane in the northern extent of the study area. It then flows north and east following artificial ninety degree turns to join Padmoor Drain at the point where it becomes WFD designated. This is an Upper Witham IDB watercourse, and is partially located within the Solar and Energy Storage Park. It has a total length of 1.5km.	This watercourse was observed along Kexby Lane. Here it almost resembled a swale, being a grassy trapezoidal channel of 1m width. It had recently been mowed with cut grass having accumulated in the channel. Plant were present dredging out the channel at the time of the visit. Kexby Lane is located within a metre of the watercourse and it is likely to receive over the edge drainage from the road. The northern bank is adjacent to an arable agricultural field, but there is a buffer strip of grassland of around 3m width.
Mother Drain	Tributary of Trent from Carlton-on-Trent to Laughton Drain Water Body	This watercourse is located at the north eastern extent of the study area (but does not cross into the Order limits). It rises adjacent to Coates Road, south of Littleborough and flows generally north to discharge to the River Trent at Out Ings. It has a	This watercourse was observed north of Littleborough Road. Mother Drain is a straightened, trapezoidal, artificial channel. It is approximately 6m wide. There is little to no floodplain connectivity due to the over deep nature of the channel banks rising 3m up from the bed. The water during the

Waterbody	Relevant WFD Catchment	Watercourse Description	Site Observations
		total length of approximately 4.3km, and is a Trent Valley IDB watercourse. It is also an LWS of interest for water beetles.	site visit was very turbid but the depth could be seen to be approximately 0.5m. The bed was dominated by fine sediment. There was a surface scum around the channel margins and duck weed was widespread. There are numerous culverted crossings of the watercourse for farm tracks.

9.7.19 There are many unnamed agricultural drains ubiquitous across the area (see **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**). Based on the site visits undertaken to date, all of these watercourses are of a highly modified character, with extensive straightened sections and ongoing dredging activity observed throughout. The presence of many of the linear watercourses within the study area is a consequence of land drainage activities which have facilitated intensive arable farming across what was once expansive floodplain and wetland environments connected to the rivers Trent and Till. Consequently, the watercourses are grossly over-deepened, trapezoidal ditches, with very little hydraulic variation, although the survey was conducted during exceptionally low flow conditions. Channel substrate is predominantly silt, with little or no gravel present, resulting in essentially no variance of bedform throughout.

9.7.20 The riparian zone adjacent to the channels is generally depleted with obvious signs of management and cutting, presumably to maintain drainage conveyance. In-channel vegetation is mostly defined by excessive nutrient ingress and lack of flow: duck weed was especially abundant, indicating that flow within the channels is very slow or stagnated.

9.7.21 Overall, the watercourses within the study area are either man-made or extensively modified, with limited potential for hydromorphological improvement.

9.7.22 There are numerous standing waterbodies and ponds located across the study area. The largest is within a meander on the western bank of the River Trent at NGR SK 82713 83290 and is approximately 4.02 ha in size. This is known as Littleborough Lagoon and is a Local Wildlife Site (LWS). It is a shallow lagoon within a flood bank and drain of botanical and ornithological importance.

9.7.23 There is a wetland area within a meander of the River Trent at Coates within the study area (but not the Order limits), known as Coates wetland (SK 83136 81442). This is an LWS, consisting of a group of pools with rough grazing land, providing an area of zoological and botanical interest.

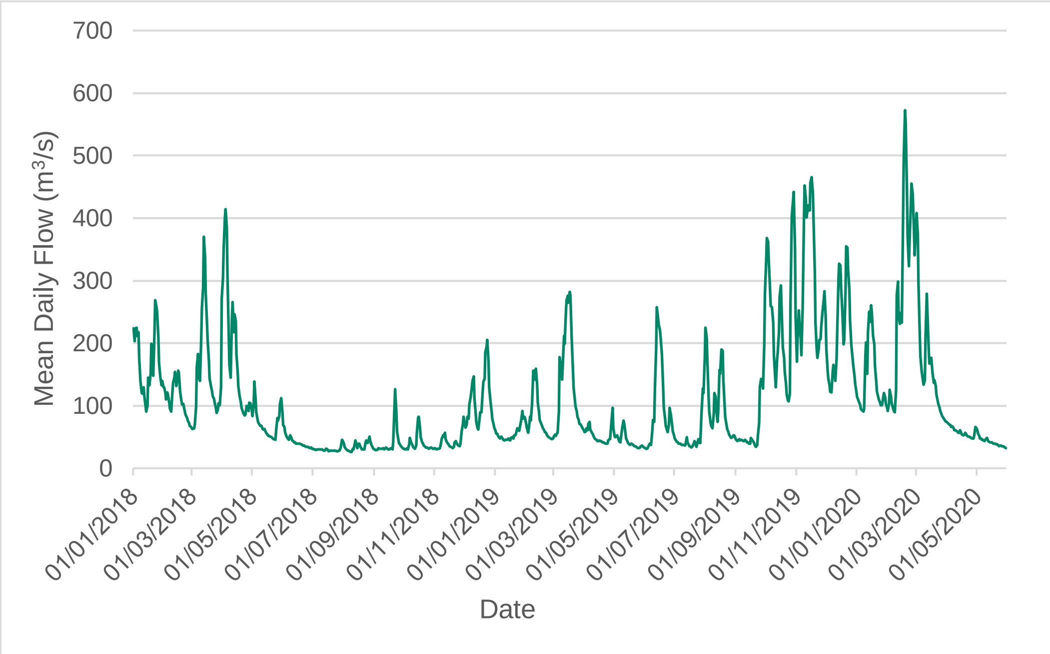
9.7.24 There are several large waterbodies within the Cottam Power Station site, as well as a wetland area located between the Cottam Power Station and River Trent in the southern extent of the study area close to Torksey Viaduct (SK 83031 79169). This wetland area is known as Cottam Wetlands and is an LWS due to being an excellent wetland mosaic comprising lagoons, marshy grasslands, swamp and a representative length of the River Trent.

9.7.25 Aside from these larger waterbodies and wetlands, there are numerous small agricultural ponds located across the entire study area. At this stage none of these small ponds are known to have any particular biodiversity value or current socio-economic use.

River Trent – Hydrology and Tidal Cycle

9.7.26 The NTL for the River Trent is approximately 28km upstream of the Order limits (Ref 9-42) at Cromwell Weir, shortly downstream of Newark-on-Trent.

9.7.27 The nearest Environment Agency gauging station on the River Trent is at North Muskham which lies approximately 23km south (upstream) of the Scheme near the village of Collingham. Annual mean flow at this station is 90.43m^3/s (based on data between 1968 and 2020), with a maximum daily flow of 857m^3/s registered on 27/02/1977. The flow that is exceeded 95% of the time (Q95) is 28.9 m^3/s (Ref 9-42). Graph 9-2 shows the mean daily flow at North Muskham for the period 2018 to 2020 inclusive.



Graph 9-2 Mean daily flow for the River Trent at North Muskham Gauging Station, 2018-2020 (Source: National River Flow Archive, Ref 9-45).

9.7.28 The River Trent is characterised by a semi-diurnal tide (i.e. a cycle which has two high and two low tides a day). There is approximately 24 hours 50 minutes between two tidal crests (for example, high– low –high–low–high) and so one tidal cycle (that is, high–low–high) has a period of approximately 12 hours 25 minutes. In this regime, the two high tide levels are commonly unequal.

9.7.29 A complete tidal cycle from high tide to low tide to high tide comprises two distinct elements – the flood tide (the incoming tide when water levels are rising) and the ebb tide (the outgoing tide when water levels are falling).

9.7.30 There are two key variations in tides which occur over a 29-day cycle (i.e. spring and neap tides), with two spring and two neap tides occurring over this period. During neap tides, the tidal range is significantly reduced compared with that experienced during spring tides (that is, high tide levels are lower and low tide levels are higher). The maximum spring and neap tides occur approximately 1.5 days after new/ full Moon or first/ last quarter. These two variations have a significant influence on the range of impact on water quality and suspended sediment.

9.7.31 The tides experienced in the River Trent estuary have very pronounced spring and neap tides. In addition, the tidal cycle seen in the River Trent estuary is not perfectly symmetrical (i.e. flood and ebb portions of the cycle are of unequal lengths). This is due to frictional resistance between oncoming and reflected tidal waves within the irregular coastline of the Humber estuary. In the River Trent, the time between ebb slack and flood slack is approximately three hours, while the difference between flood slack and ebb slack is approximately nine hours. This gives rise to a very rapid rise in tide level followed by a slow decline in the tide level. These times are subject to natural variation, particularly due to weather and flow within the River Trent itself (Ref 9-62).

9.7.32 At Gainsborough, the usual range of the River Trent taking account of tidal variability is between 1.29m and 5.00m (Ref 9-63).

9.7.33 There are two Trent Valley IDB pumping stations located on the banks of the River Trent in the study area, with one located on the east bank adjacent to Marton (NGR SK 82576 81524) and another on the west bank adjacent to Coates (SK 83487 81342), see **ES Volume 2: Figure 9-4 [EN010131/APP/3.2]**. There are a further two pumping stations at Torksey Lock, south of the study area.

Water Quality

9.7.34 Water quality data for the River Trent (at Dunham), Seymour Drain, Marton Drain (at Brampton Grange) and the Tributary of the Till (Carr Drain) at Kexby Lane has been obtained from the Environment Agency's Water Quality Archive website (Ref 9-47) and is summarised in Table 9-6a and 9-6b for the period 2017-2021, with relevant WFD standards provided for comparison in Table 9-7. Monitoring locations are shown on **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**.

9.7.35 Table 9-6a indicates that the River Trent is slightly alkaline in nature, with an average pH of 8.09 and falls into the WFD classification of High (see Table 9-7 for WFD environmental quality standards). A 10th percentile dissolved oxygen saturation of 88.66% is over the High classification threshold which suggests the waterbody is well oxygenated. Ammonia concentrations are classified as High which suggests pollution from organics such as sewage materials are not having a detrimental effect on the waterbody. Nitrates and orthophosphate concentrations are elevated, and is not surprising given the agricultural landscape surrounding the River Trent in this stretch of the river.

9.7.36 Table 9-6a indicates the water quality at Seymour Drain at Cottam is circum-neutral with a mean pH of 7.68 and this falls within the WFD High classification, based on the 44 samples considered here (2017-2021). A 10th percentile dissolved oxygen saturation of 50.24% falls within the Poor WFD classification (with a 10th percentile of 54% being Moderate). Biochemical Oxygen Demand (BOD) is within the High WFD classification with a concentration of 1.419mg/l, suggesting low levels of organic pollution. Ammonia levels fall within the WFD classification for High at a 90th percentile value of 0.17mg/l (90th percentile lower than 0.3 mg/l is High) which similarly suggests pollution from organics is limited. Nitrate values are elevated (mean of 8.009mg/l N), as are orthophosphate concentrations (mean 0.68 mg/l) and again indicate probable pressure from the surrounding agricultural land uses through use of fertilisers and other products which may runoff to the watercourse.

9.7.37 Table 9-6b indicates that Marton Drain at Brampton Grange is circum-neutral with a mean pH of 7.62 and falls within the WFD high classification, based on the 28 samples considered here. A 10th percentile dissolved oxygen saturation of 65.88% is Good (with a 10th percentile of 70% being High under the WFD EQS) which suggests the waterbody is well oxygenated. BOD falls within the Moderate WFD classification with a 90th percentile value of 6.68mg/l, suggesting moderate levels of organic pollution. However, the maximum value recorded is 19 mg/l, which indicates periodic episodes of worsened organic pollution. Ammonia concentrations fall within the WFD classification for Good at a 90th percentile value of 0.6mg/l. Nitrate values are high (mean of 10.33mg/l N) and indicate probable pressure from the surrounding agricultural land uses. Orthophosphate values have a mean of 0.1mg/l.

9.7.38 Table 9-6b indicates that the tributary of the River Till at Kexby Lane is circumneutral with a mean pH of 7.75 (within the WFD EQS, see Table 9-7), based on the 15 samples considered here. Dissolved oxygen saturation is within the WFD High classification range, BOD and ammonia meet the High EQS indicating low organic pollution. Nitrate values are elevated (mean of 7.31mg/l N) similarly to the other monitoring sites relating to the study area and indicate agricultural pressure. However, orthophosphate values are lower than at the other nearby monitoring sites with a mean of 0.038mg/l.

Gate Burton ENERGY PARK

Table 9-6a Summary Environment Agency water quality monitoring data (2017-2021)

Determinant	Units	Seymour Drain					Tidal Trent – at Dunham				
		Average	*Max*	*Min*	*90th%ile*	*10th%ile*	*Average*	*Max*	*Min*	*90th%ile*	*10th%ile*
pH	pH Units	7.68	8.05	7.17	7.9	7.4	8.09	9.01	7.67	8.16	7.91
Temperature of Water	°C	10.9	16.7	4.1	16.04	5.92	10.6	21.6	4.6	19.0	5.1
Conductivity at 25°C	µs/cm	1692	1807	1542	1779	1600	812	1035	505	976	612
Biochemical Oxygen Demand (BOD): 5 Day ATU	mg/l	1.2	1.5	1.0	1.4	1.0	-	-	-	-	-
Ammoniacal Nitrogen as N	mg/l	0.09	0.85	0.03	0.18	0.03	0.12	0.44	0.03	0.23	0.03
Nitrogen, Total Oxidised as N	mg/l	8.61	15.5	4.20	11.0	6.52	9.2	12.3	5.5	10.98	7.19
Nitrate as N	mg/l	8.01	10.9	4.42	9.434	6.39	8.37	11.4	4.35	10.32	6.47
Nitrite as N	mg/l	0.049	0.110	0.019	0.082	0.021	0.32	7.92	0.01	0.09	0.02
Ammonia un-ionised as N	mg/l	0.0007	0.0026	0.0002	0.0013	0.0003	0.002	0.015	0.001	0.003	0.001
Alkalinity to pH 4.5 as CaCO3	mg/l	236.2381	280	200	260	210	164	178	136	178	144
Orthophosphate, reactive as P	mg/l	0.678	1.77	0.256	1.188	0.289	0.269	0.44	0.12	0.39	0.16
Oxygen, Dissolved, % Saturation	%	78.52	132.8	20	98.09	50.24	96.32	118.40	83.3	100.47	88.66

Determinant	Units	Seymour Drain					Tidal Trent – at Dunham				
		Average	*Max*	*Min*	*90th%ile*	*10th%ile*	*Average*	*Max*	*Min*	*90th%ile*	*10th%ile*
Oxygen, Dissolved as O2	mg/l	8.67	14.7	3.74	11.6	4.61	10.85	13.00	7.69	12.66	8.71

Table 9-6b Summary of Environment Agency water quality monitoring data (2017-2021)

Determinant	Units	Marton Drain at Brampton Grange					Tributary of the Till at Kexby Lane				
		Average	*Max*	*Min*	*90th%ile*	*10th%ile*	*Average*	*Max*	*Min*	*90th%ile*	*10th%ile*
pH	pH Units	7.62	8.31	7.32	7.85	7.41	7.75	8.34	7.34	8.16	7.38
Temperature of Water	°C	10.74	19.80	3.50	19.12	4.38	9.29	15.8	2.5	14.38	4.04
Conductivity at 25°C	µs/cm	1032	1044	1020	1041	1022	731	1010	504	914	598
Biochemical Oxygen Demand (BOD): 5 Day ATU	mg/l	3.41	19.0	1.00	6.68	1.18	2.1	5.6	1	2.8	1
Ammoniacal Nitrogen as N	mg/l	0.37	3.70	0.03	0.60	0.05	0.13	0.73	0.035	0.129	0.039
Nitrogen, Total Oxidised as N	mg/l	10.45	33.00	5.57	15.00	5.76	7.35	17.0	2.20	10.49	3.32
Nitrate as N	mg/l	10.33	32.90	5.49	15.40	5.65	7.31	16.80	2.18	10.48	3.28
Nitrite as N	mg/l	0.0952	0.3400	0.0250	0.1578	0.0351	0.03999	0.1900	0.0154	0.0519	0.0168
Ammonia un-ionised as N	mg/l	0.002	0.018	0.000	0.003	0.0004	0.0010	0.0026	0.0001	0.0025	0.0001
Alkalinity to pH 4.5 as CaCO3	mg/l	207	250	130	233	190	205	258	110	238	187
Orthophosphate, reactive as P	mg/l	0.1063	0.2900	0.0100	0.2000	0.0270	0.038	0.074	0.019	0.056	0.021

Determinant	Units	Marton Drain at Brampton Grange					Tributary of the Till at Kexby Lane				
		Average	*Max*	*Min*	*90th%ile*	*10th%ile*	*Average*	*Max*	*Min*	*90th%ile*	*10th%ile*
Oxygen, Dissolved, % Saturation	%	89.97	148.50	52.40	138.28	65.88	87.91	126	48.3	120.28	60.78
Oxygen, Dissolved as O2	mg/l	9.95	15.50	6.30	13.63	7.43	10.14	14.8	5.01	13.4	7.09

Table 9-7 Summary of WFD Standards for watercourses in the study area

Determinant	Unit	Statistic	High	Good	Moderate	Poor	Bad
BOD	mg/l	90%ile	4	5	6.5	9	>9
Ammonia	mg/l	90%ile	0.3	0.6	1.1	2.5	>2.5
Dissolved Oxygen	% sat	10%ile	70	60	54	45	<45
pH	pH units	High-Good: 5 and 95%ile; Mod-Poor 10%ile	>6 &<9	>6 &<9	4.7	4.2	<4.2
Temperature	Degrees Celsius (ºC)	98%ile (not in salmonid WBs and canals)	25	28	30	32	>32

Aquatic Ecology

9.7.39 Historic records of fish, macroinvertebrate and aquatic macrophyte surveys within the last ten years are available from the Environment Agency Ecology and Fish Data Explorer website. Details of relevant Environment Agency monitoring sites are summarised in Table 9-8:.

Table 9-8: Location of relevant Environment Agency fish, macroinvertebrate and macrophyte monitoring sites in the study area

Site name (ID)	WFD Waterbody	Site National Grid Reference	Distance from Site	Year last surveyed	Group monitored
Marton Drain (52709)	GB104028057840	SK8350081240	0.05km d/s of Grid Connection Corridor crossing	2020	Macrophytes
Marton Drain (54038)	GB104028057840	SK8412980987	0.02km d/s of GCR crossing	2013	Invertebrates
Seymour Drain (165003)	GB104028058340	SK8216480935	0.2km d/s of GCR crossing	2015	Macrophytes
Seymour Drain (158852)	GB104028058340	SK8258081417	0.9km d/s of GCR crossing	2012	Invertebrates
Padmoor Drain (160480/161709)	GB105033062480	SK8723683541	Within Solar and Energy Storage Park boundary	2016	Invertebrates, Macrophytes

9.7.40 Three macroinvertebrate surveys were undertaken at the Marton Drain (52709) monitoring site between March and October 2013. A total of 47 macroinvertebrate taxa were recorded, including two non-native species: the non-invasive New Zealand mud snail *Potamopyrgus antipodarum* and the invasive amphipod *Crangonyx pseudogracilis/floridanus*. No protected macroinvertebrate taxa were recorded.

9.7.41 One macroinvertebrate survey was undertaken at the Seymour Drain (158852) monitoring site in March 2012. A total of 28 macroinvertebrate taxa were recorded, including the non-native and invasive C. *pseudogracilis/floridanus*. No protected macroinvertebrate taxa were recorded.

9.7.42 Four macroinvertebrate surveys were undertaken at the Padmoor Drain (160480) monitoring site in March and September 2013 and 2016. A total of 61 macroinvertebrate taxa were recorded, including two non-native species: *P. antipodarum* and *C. pseudogracilis/floridanus*. No protected macroinvertebrate taxa were recorded.

9.7.43 One macrophyte survey was undertaken at the Marton Drain (52709) monitoring site in August 2020. A total of 15 macrophyte taxa were recorded, including the non-native and invasive Nuttal's waterweed *Elodea nuttallii*. No protected macrophyte species were recorded.

9.7.44 Two macrophyte surveys were undertaken at the Seymour Drain (165003) EA monitoring site in June 2013 and August 2015. A total of 20 macrophyte taxa were recorded, including the invasive *E. nuttallii*. No protected macrophyte species were recorded.

9.7.45 The nearest fish survey undertaken on the River Trent was at North Clifton (SK8167872697), approximately 9km upstream. The most recent survey undertaken at this site was in October 2015. A single catch sample recorded 117 chub *Leuciscus cephalus*, 117 bleak *Alburnus alburnus*, 20 minnow *Phoxinus phoxinus*, 3 3-spined stickleback *Gasterosteus aculeatus*, 2 perch *Perca fluviatilis*, 1 roach *Rutilus rutilus*, 1 common goby *Pomatoschistus microps*, and 1 flounder *Platichthys flesus*.

9.7.46 Further aquatic surveys have been undertaken for watercourses across the Scheme area and are detailed in **Appendix 8-E: Aquatic Ecology Report [EN010131/APP/3.3]**. No protected species have been recorded in macroinvertebrate or macrophyte surveys. However, of note was the presence of the nationally scarce beetle *Scarodytes halensis* in Padmoor Drain, and the macrophyte *Potomogeton friesii* in Seymour Drain which is considered vulnerable in England.

Nature Conservation Sites

9.7.47 Within the study area, there are no designated protected areas of national importance including Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), National Nature Reserves (NNRs), or Local Nature Reserves (LNRs). The nearest such site is the Lea Marsh SSSI, approximately 1.8km north-west of the Solar and Energy Storage Park. The Lea Marsh SSSI is 27ha in area. It is designated as an important area of unimproved floodplain meadow and wet pasture adjacent to the River Trent. The site lies on seasonally-inundated alluvial soils and includes an unusually large area of a nationally rare grassland type. Populations of two nationally scarce plants (narrow-leaved water-dropwort *Oenanthe silaifolia* and mousetail *Myosurus minimus*) with a restricted distribution in the East Midlands are particularly notable, whilst breeding waders provide additional interest. Approximately 45% of the site is meeting 'favourable' status, while 52% is 'unfavourable – no change' (Ref 9-51). While this site is on the floodplain of the River Trent, it is over 9km downstream of the proposed Grid Connection Corridor crossing beneath the Trent, and as such there is not considered a pathway to impact this site, given the large dilution and dispersal potential for pollutants offered by the river. It is therefore scoped out of further assessment.

9.7.48 There are seven Non-Statutory Designated LWS sites of aquatic importance within the study area. Details of these sites are shown in Table 9-9 below.

Table 9-9: Non-Statutory Designated Sites of aquatic importance within the study area

Site name	Designation	Grid Reference	Relation to site	Nature conservation interest
Thurlby Wood	LWS	SK 84676 86417	0.4km from Solar and Energy Storage Park boundary	Semi-natural ancient woodland of significant botanical interest. Wettest parts of the site, including a pond, support a range of macrophytes
Out Ings	LWS	SK 82566 84730	0.5km from Solar and Energy Storage Park boundary	A diverse mosaic of grassland, open water and carr communities adjacent to the River Trent
Mother Drain, Upper Ings	LWS	SK 82148 83371	Partially within study area for Grid Connection Corridor	A drain of interest for water beetles
Littleborough Lagoons	LWS	SK 82719 83297	In the wider study area for the Solar and Energy Storage Park	A shallow lagoon with flood bank and drain of botanical and ornithological importance
Coates Wetland	LWS	SK 83136 81442	In the wider study area for the Grid Connection Corridor	A group of pools with rough grazing land and a section of the River Trent, providing an area of zoological and botanical interest
Cow Pasture Lane Drains	LWS	SK 80682 80384	Crossed by Grid Connection Corridor	Drains with notable aquatic and bank-side vegetation
Cottam Wetlands	LWS	SK 83031 79169	In the wider study area for the Grid Connection Corridor	A wetland mosaic comprising lagoons, marshy grasslands, swamp and a representative length of the River Trent

Water Resources

9.7.49 The north-west of the Order limits and the 1km study area west of Knaith and south to Littleborough falls under a Drinking Water Protected Area. Drinking Water Protected Areas (Surface Water) are where raw water is abstracted from rivers and reservoirs and additional measures are required to protect the raw water supply to reduce the need for additional purification treatment (Ref 9-49). However, the study area does not fall within any Drinking Water Safeguard Zones for surface water or groundwater (Ref 9-65).

9.7.50 The entire study area is split between four Nitrate Vulnerable Zones (NVZ). These are i) NVZ S347 - R Trent from Carlton-on-Trent to Laughton Drain; ii) NVZ S375 - Lower Witham; iii) NVZ S343 Seymour Drain Catchment (trib of Trent); and iv) NVZ S344 - Catchwater Drain Catchment (trib of Trent). NVZs are statutory designated areas at risk from agricultural nitrate pollution and includes about 55% of land in England. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015.

9.7.51 There are no Source Protection Zones within the study area (Ref 9-49).

9.7.52 The River Trust's 'Is My River Fit to Play In' website (Ref 9-64) indicates that there is a combined sewer overflow into Causeway Drain within the study area (permit ANNNF13805), as well as a pumping station discharging sewage into Padmoor Drain (permit AW3NFF384) and sewage treatment works discharging treated effluent into a tributary of Marton Drain (permit T/69/45820/R) and Seymour Drain (permit EPRJP31214GK).

9.7.53 Details of Private Water Supplies (PWS) in the study area was requested from West Lindsey District Council and Bassetlaw District Council. Bassetlaw District Council and West Lindsey District Council have confirmed that there are no known PWS in the study area.

9.7.54 Data on surface and groundwater abstractions in the study area have been identified from the Environment Agency's 'Water Resources: Help for license trading' website (Ref 9-86). The abstractions are shown in Table 9-10.

Table 9-10: Licensed abstractions in the study area

Figure Ref.	License Holder & No.	Use	Source	NGR	Surface/ Groundwater
A1	GH CHENNELS FARMS LTD 03/28/69/0236/1/R01	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 82656 82556	Surface
A2	RAY SMALL CONTRACTORS 03/28/69/0292	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 82621 82494	Surface
A3	J S HIGHFIELD AND SONS 03/28/69/0188	Spray Irrigation - Direct	Surface Water (Seymour Drain)	SK 81948 80817	Surface
A4	EDF Energy (Thermal Generation) Limited 03/28/69/0069	Non-evaporative Cooling	Tidal Water (River Trent)	SK 82428 78770	Surface
A5	Tarmac Aggregates Limited 03/28/69/0242	Mineral Washing	River Gravels - Lower Trent Area	SK 82207 78587	Groundwater
A6	RAY SMALL CONTRACTORS 03/28/69/0298	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 83150 80531	Surface
A7	R & A Brownlow and Brownlow 03/28/69/0202	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 83152 80466	Surface
A8	RAY SMALL CONTRACTORS 03/28/69/0298	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 83161 80296	Surface

Figure Ref.	License Holder & No.	Use	Source	NGR	Surface/ Groundwater
A9	RA & AO Brownlow 03/28/69/0299	Spray Irrigation - Direct	Tidal Water (River Trent)	SK 84062 79910	Surface

9.7.55 There are eight surface water abstractions in the study area, all of which are from the River Trent with the exception of one from Seymour Drain. They are all for direct spray irrigation (agriculture) with the exception of a permit for abstraction for non-evaporative cooling at Cottam Power Station.

9.7.56 There is one groundwater abstraction south of Cottam Power Station within the study area that is from the river gravel deposits for the purposes of mineral washing. There are no groundwater abstractions in the vicinity of the Solar and Energy Storage Park.

Flood Risk

Solar and Energy Storage Park

9.7.57 Flood risk from all sources for the Solar and Energy Storage Park is summarised in Table 9-10. Refer to **ES Volume 2: Figure 9-2 [EN010131/APP/3.2]** for mapping of fluvial flood risk in relation to the Scheme, and **ES Volume 2: Figure 9-3 [EN010131/APP/3.2]** for mapping of surface water flood risk, and **Volume 2: Figure 9-5 [EN010131/APP/3.2]** for Groundwater Flood Risk Mapping, and **Volume 2: Figure 9-6 [EN010131/APP/3.2]** for Reservoir Flood Risk Mapping.

Table 9-10: Flood Risk from All Sources –Solar and Energy Storage Park

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (majority)	**Source: Environment Agency Flood Zone Dataset**
	High (North east side and east boundary, Padmoor drain corridor)	The Solar and Energy Storage Park is predominantly in Flood Zone 1 (land assessed as having a less than 1 in 1000 annual probability of river or sea flooding). However, the north-east corner of the Solar and Energy Storage Park does cross an area of Flood Zone 2 and 3 associated with Padmoor drain (ordinary watercourse) along Kexby Lane. This is land assessed as having between a 1 in 1000 (0.1% Annual Exceedance Probability (AEP)) and 1 in 100 (1% AEP) annual probability of river flooding. To the east of the Solar and Energy Storage Park is a corridor of Flood Zone 3 that is associated with Padmoor Drain (1 in 100 or greater annual probability of river flooding (>1% AEP)), draining south towards the River Till. **Source: West Lindsey SFRA (2009)** (Ref 9-67) SFRA uses Flood Zone 2 as a proxy for extent of Flood Zone 3a including climate change (possible extent of Flood Zone 3 in 100 years (based on predictions in 2009). No areas of Functional Floodplain (Flood Zone 3b) are identified within the Solar and Energy Storage Park.

Flood Risk Source	Flood Risk Level	Comments
		Using Flood Zone 2 as a surrogate for the climate change Flood Zone 3a extent, flood risk is still confined to the watercourse, so there will be no change in flood risk in this location, to or for the Scheme. **Summary:** The majority of the Site lies in Flood Zone 1, with areas of Flood Zone 2 and 3a running across the north-east corner of the Solar and Energy Storage Park and along the eastern border, both associated with Padmoor Drain. Development should be located outside Flood Zone 3b, unless it is classified as “essential infrastructure”, or “water compatible” in design, and has passed the exception test. However, there are no areas identified within Flood Zone 3b for the Solar and Energy Storage Park (Ref 9-25).
Surface Water	Very low (majority) Low – high (localised shallow patches)	**Source: EA surface water flood risk mapping** (Ref 9-68) The risk of surface water flooding is generally very low (annual chance of flooding of less than 0.1% AEP) for most of the site, with areas of low (chance of flooding of between 0.1% and 1% AEP), medium (chance of flooding of between 1% and 3.3% AEP) and high risk (chance of flooding of greater than 3.3% AEP) generally associated flow pathways following topographic low points including drains and agricultural ditches. Padmoor Drain, the western side of the railway line embankment and the southern fields draining from the Solar and Energy Storage Park show the greatest extent of potential surface water flooding. The water depth associated with both the high and medium risk scenarios is generally less than 900mm and very localised. For the low risk (chance of flooding of between 0.1% and 1%) scenario depths only exceed 900mm in only a very limited area.
Ground water	Low	**Source: Lincolnshire County Council PFRA 2011** (Ref 9-66) PFRA mapping indicates susceptibility to groundwater flooding is predominantly <25% with minimal areas of 25-50% and 50-75% susceptibility. **Source: BGS ‘Susceptibility to Groundwater Flooding’ mapping** This indicates that the majority of the Solar and Energy Storage Park is classified as having a ‘limited potential for groundwater flooding to occur’. However, isolated sections of the Solar and Energy Storage Park, particularly near Kexby Lane and Clay Farm are categorised as either having the ‘potential for groundwater flooding of property situated below ground level’ or the ‘potential for groundwater flooding to occur at surface’.

Flood Risk Source	Flood Risk Level	Comments
Sewers	Very low	**Source: Anglian Water Drainage and Water Search** The Solar and Energy Storage Park is considered to be at a very low risk of sewer flooding based on location and extent of assets shown in the Anglian Water Drainage & Water Plans.
Artificial	Very low	**Source: Environment Agency Flood Risk from Reservoirs mapping** The Solar and Energy Storage Park is not at risk from reservoir flooding. The closest extent associated with reservoir failure is located approximately 250m from the western edge of the Solar and Energy Storage Park at its closest point but is generally greater than 500m. The flood extent associated with the reservoir failure is constrained within the River Trent floodplain with predominant flooding occurring to the west of the River Trent, therefore not affecting the Solar and Energy Storage Park.
Tidal	Negligible	**Source: Environment Agency Flood Zone Dataset** Based on a review of the Environment Agency Flood Map, the Solar and Energy Storage Park is not considered at risk from tidal flooding associated with the River Trent.

Grid Connection Corridor

9.7.58 Flood risk from all sources for the Grid Connection Corridor is summarised in Table 9-11. Refer to **ES Volume 2: Figure 9-2 [EN010131/APP/3.2]** for mapping of fluvial flood risk in relation to the Scheme, and **ES Volume 2: Figure 9-3 [EN010131/APP/3.2]** for mapping of surface water flood risk, and **Volume 2: Figure 9-5 [EN010131/APP/3.2]** for Groundwater Flood Mapping, and **Volume 2: Figure 9-6 [EN010131/APP/3.2]** for Reservoir Flood Risk Mapping.

Table 9-11: Flood Risk from All Sources – Grid Connection Corridor

Flood Risk Source	Flood Risk Level	Comments
Fluvial	High (but defences are present)	**Source: EA Flood Zone mapping** (Ref 9-68) Majority of the Grid Connection Corridor is in Flood Zone 3 (1 in 100 or greater annual probability of river flooding), entering this zone shortly after exiting the southern boundary of the Solar and Energy Storage Park at Marton and remains within Flood Zone 3 for the remainder of the route. South of Marton the proposed route crosses a flood alleviation channel associated with Marton pumping station, as well as several smaller drains on both sides of the River Trent. The corridor intersects the flood defence embankments on the eastern side of the River Trent crossing, and on the western side. On the west bank the route intersects the western flood

Flood Risk Source	Flood Risk Level	Comments
		defence embankment before continuing north of Cottam. Flood Zone 2 and 3 are associated with the River Trent and its floodplain, however there are flood defences that border this watercourse through its entire length through the Scheme. **Source: West Lindsey SFRA (2009)** (Ref 9-67) **– East of R. Trent** SFRA uses Flood Zone 2 as a proxy for extent of Flood Zone 3a including climate change (possible extent of flood zone 3 in 100 years (based on predictions in 2009)). Assuming Flood Zone 2 as the climate change Flood Zone 3a extent as a conservative approach, there is no change in flood risk to the Grid Connection Corridor to the east of the River Trent. **Source: Bassetlaw SFRA (2019)** (Ref 9-69**) – West of R. Trent** The climate change mapping in this SFRA uses the results from the existing Environment Agency hydraulic models (100-year +20%) and where no hydraulic models exist, Flood Zone 2 has been used as a conservative indication. EA mapping along the Grid Connection Corridor (100-year + 20%) appears to result in the same extent as the current Flood Zone 3 and does not exceed Flood Zone 2. Assuming Flood Zone 2 as the climate change Flood Zone 3a extent as a conservative approach, there is no change in flood risk to the Grid Connection Corridor to the west of the River Trent. **Summary:** The majority of the Grid Connection Corridor is in Flood Zone 3a, associated with the River Trent and its floodplain. Development should not be permitted within Flood Zone 3 unless it is classified as “essential infrastructure”. In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
Surface Water	Very low (majority)	**Source: EA surface water flood risk mapping** (Ref 9-68) The risk of surface water flooding is generally very low (annual chance of flooding of less than 0.1% AEP) with isolated patches of low (chance of flooding of between 0.1% and 1% AEP), medium (chance of flooding of between 1% and 3% AEP) and high risk (chance of flooding of greater than 3.3% AEP) generally associated with drains and agricultural ditches.

Flood Risk Source	Flood Risk Level	Comments
		The Bassetlaw SFRA (Ref 9-69) confirms that the Grid Connection Corridor does not fall within a Critical Drainage Area.
Groundwater	High	**Source: Lincolnshire County Council PFRA 2011** (Ref 9-66) PFRA mapping indicates susceptibility to groundwater flooding is predominantly >75% within the Grid Connection Corridor. **Source: BGS 'Susceptibility to Groundwater Flooding' mapping** The BGS 'Susceptibility to Groundwater Flooding' corroborates the information provided in the PFRA, as it indicates that the majority of the Grid Connection Corridor is categorised as having the 'potential for groundwater flooding to occur at the surface'.
Sewers	Very Low	**Source: Bassetlaw SFRA Addendum (2021)** Considered very low risk based on information within the SFRA Addendum (1-2 sewer flooding incidences across postcode area that falls within Grid Connection Corridor). **Source: Severn Trent Water Drainage and Water Plans** The latter indicates that only a small fraction (less than 600m) of the Grid Connection Corridor to the south of Marton is crossed by public sewers owned by Severn Trent Water. The search area is recorded as not being at risk of flooding from overwhelmed public sewers.
Artificial	High	**Source: EA Risk of reservoir flooding** map (Ref 9-68) The River Trent and some of its immediate riparian margin as it passes through the Grid Connection Corridor is within the risk of flooding from a reservoir breach. The majority of the route is covered by the combined risk of when there is also flooding from rivers, with a small area north and east of Cottam that would be flooded when river levels are normal. Statutory reservoirs (large, raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. Therefore, whilst the consequence of failure is high, the likelihood of failure is very low.
Tidal	Low	There is a tidal influence, in this area however it is reasonable to assume that the fluvial influence is likely to outweigh the tidal influence and therefore

Flood Risk Source	Flood Risk Level	Comments
		the risk from tidal flooding is considered low based on the distance upstream from river mouth and flood defences in the area.

Future Baseline

9.7.59 The future baseline scenarios are set out in **ES Volume 1, Chapter 5: EIA Methodology [EN010131/APP/3.1]** and described below.

Future Baseline – 2025-2026 No Development, 2025-2028 Construction, 2028 Operation

Surface Water

9.7.60 The River Till WFD waterbody and Skellingthorpe Main Drain WFD waterbody are currently at their target WFD objective for 2015 (Moderate Ecological Status), whereas the remaining WFD waterbodies are all below their target objectives for 2027.

9.7.61 There is a general trend for water quality improvements over time in response to improved regulation and treatment practices. However, the current receptor importance criteria presented in Table 9-1 is largely based on the presence or not of various attributes (e.g. Drinking Water Protected Area, designated nature conservation site or WFD designation) and flow (i.e. the size of the watercourse). The application of these criteria is therefore not sensitive to more subtle changes or improvements in water quality as may be experienced over time. Thus, no significant changes to current baseline conditions are predicted for the future baseline in the absence of the Scheme, as the principal reasons for differences in water body importance are unlikely to change. For this reason, the impact assessment within this chapter is undertaken against existing baseline conditions.

Groundwater

9.7.62 The WFD groundwater bodies (Lower Trent Erewash – Secondary Combined and Witham Lias) are at their target WFD objective of Good Status.

9.7.63 No significant changes to current baseline conditions are predicted for the future baseline for the same reasons as outlined above for surface water. The impact assessment within this chapter is therefore undertaken against existing baseline conditions.

Flood Risk

9.7.64 Climate change is predicted to alter the future fluvial flood risk and thus it is important that it is taken into account by the Scheme FRA (see **ES Volume 3: Appendix 9-D [EN010131/APP/3.3])**. Climate change resilience is accounted for within the surface water drainage strategy for the Scheme, accommodating current government climate change projections (see **ES Volume 3: Appendix 9-C [EN010131/APP/3.3])**.

9.7.65 The Scheme will not alter the current flood risk baseline described above. The drainage strategy seeks to ensure no detrimental impact relating to the surface water runoff from the Scheme following its construction. Therefore, no significant adverse changes to current baseline conditions are predicted for the future baseline, and so the impact assessment is undertaken against existing baseline conditions.

Future Baseline (Decommissioning) - (assumed for the purpose of the assessment to be up to 48 months, not earlier than 2088)

9.7.66 It is considered that continued environmental improvements, tighter regulation at both national, regional and local scales, and environmental enhancements would lead to a gradual improvement over current baseline conditions in terms of water quality.

9.7.67 Climate change has the potential to significantly impact on drainage and flood risk, for example through increased storm intensity and changes in future rainfall patterns. However, the design of the Scheme will incorporate the climate change projections required by the Environment Agency to ensure that potentially increased surface water flows are accounted for and managed across the lifetime of the Scheme. Therefore, no significant adverse changes to current baseline conditions are predicted for the future baseline in 2088 (assumed to be the decommissioning date), and so the impact assessment within this chapter is undertaken against existing baseline conditions.

Importance of Receptors

9.7.68 Table 9-12 provides a summary of the waterbodies that may be impacted by the Scheme (i.e. there is a source and a possible pathway), a description of their attributes, and states the importance of the waterbody as used in this impact assessment. Importance is based on the criteria presented in Table 9-1. Separate importance classifications are provided for water quality and morphological aspects of waterbodies as it is not always appropriate to have the same rating (e.g. a waterbody may be heavily modified or even artificial and thus have a low morphology importance, but the water quality may be high by virtue of supporting protected species or other important potable or socio-economic and recreational uses). Refer to **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]** for surface water features.

Table 9-12: Importance of Receptors

Waterbody	Importance
River Trent (Trent from Carlton-on-Trent to Laughton Drain WFD waterbody)	Very High importance receptor for water quality on the basis of its scale, being WFD designated and having a Q95 flow greater than 1m^3/s. It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater, which at the same time influence water quality and present a risk of chemical spillages. The river's importance for water supply and navigation add to its importance. Low importance for morphology due to the heavily modified nature of the channel, particularly along the banks.
River Till WFD waterbody	High Importance for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of <1.0 m^3/s. However, there is expected to be pressure on water quality in the watercourse from agricultural pollution. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with

Waterbody	Importance
	steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Tributary of the Till WFD waterbody / Carr Drain	High Importance for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of <1.0 m^3/s. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Marton Drain Catchment (Trib of Trent) (GB104028057840)	High Importance for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of <1.0 m^3/s. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution. It also receives treated sewage from Marton STW and is therefore of importance for dispersal of this effluent. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Seymour Drain Catchment (GB104028058340)	High Importance for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of <1.0 m^3/s. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution and there is a surface water abstractions from the watercourse in the study area for agriculture. It also receives treated sewage from Cottam STW and is therefore of importance for dispersal of this effluent. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Skellingthorpe Main Drain waterbody (GB105030062390)	High Importance for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of <1.0 m^3/s. The watercourse itself is geographically distant from the Scheme, but its upstream catchment does extend north to cover much of the Solar and Energy Storage Park. Low Importance for morphology on the basis of artificially straight and heavily modified.
Padmoor Drain	Medium Importance for water quality on the basis of not being a WFD designated watercourse but has an estimated Q95 flow of >0.001 m^3/s. The watercourse is expected to be under pressure from agricultural pollution. The watercourse has some importance in dispersing effluent from a pumping station which discharges into it, and which is then conveyed downstream to the Tributary of the Till WFD waterbody. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Mother Drain	Medium Importance for water quality on the basis of not being a WFD designated watercourse but has an estimated Q95 flow of >0.001 m^3/s. The watercourse is expected to be under pressure from agricultural pollution. The watercourse is also an LWS due to it water beetle population. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.

Waterbody	Importance
Causeway Drain	Medium Importance for water quality on the basis of not being a WFD designated watercourse and has an estimated Q95 flow that may be below 0.001 m^3/s. However, the watercourse has some importance in dispersing effluent from a pumping station which discharges into it, and which is then conveyed downstream to the Tributary of the Till WFD waterbody. Low Importance for morphology on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places with a lack of any bedform variability and is subject to significant fine sediment accumulation.
Ubiquitous Drains and Ditches	As artificial, generally ephemeral agricultural drains and ditches lacking any protected species or designations, these are considered Low Importance waterbodies for water quality and morphology.
Littleborough Lagoon / Cottam Wetland / Coates Wetland	As these waterbodies all support LWS they are considered to be of medium importance for water quality. Low importance for morphology given they are largely artificial waterbodies related to past activity on the floodplain of the River Trent.
Waterbodies at Cottam Power Station	As artificial waterbodies lacking any known protected species or designations, these are considered Low Importance waterbodies for water quality and morphology.
Small Ponds	Low Importance for water quality given they are ubiquitous across the study area, and have no known ecological value at this stage. Given their abundance in the study area the ponds are considered to not reach the required levels to fulfil the criteria of a priority habitat and are considered as being of no more than local importance. Low importance for morphology as generally artificial waterbodies or have been heavily impacted by surrounding land uses (i.e. agriculture).
Groundwater	Medium importance as all bedrock and superficial deposits are Secondary aquifers. Groundwater supports some industrial abstraction for mineral washing in the study area. The groundwater across the study area is also WFD designated and at Good Status.

Floodplain Sensitivity for Impact Assessment

9.7.69 For the construction assessment, the key receptor in terms of all forms of flood risk are the construction workers present within the Order limits, who are considered to be of Very High sensitivity.

9.7.70 For the operation assessment, the importance is based on understanding of the receptors present within areas at risk of flooding and the existing risk of flooding from all sources.

9.7.71 The majority of the Solar and Energy Storage Park lies in Flood Zone 1, with areas of Flood Zone 2 and 3 running across the north-east corner of the Solar and Energy Storage Park and along the eastern border, both associated with Padmoor Drain. The majority of the Grid Connection Corridor is in Flood Zone 3, associated with the River Trent and its floodplain. Development should not be located inside Flood Zone 3b (functional floodplain), unless it is classified as “essential infrastructure”, has passed the exception test, and is water compatible in design (Ref 9-25).

9.7.72 The areas of Flood Zone 2 and 3 around the watercourses are at medium to high sensitivity to fluvial flooding. In EIA terms the sensitivity is Very High, due to the presence of essential power supply infrastructure (see Table 9-2). However, the larger areas of agricultural land across the study area are less sensitive and not considered essential infrastructure.

9.7.73 The criteria described in Table 9-2 does not provide examples of sensitivity for other forms of flood risk and so the sensitivity is based on the existing baseline risk described earlier in this chapter. For the purpose of this impact assessment the sensitivity of non-fluvial forms of flood risk is as follows:

- Flooding from surface water – generally very low risk (annual chance of flooding of less than 0.1% AEP) for most of the Solar and Energy Storage Park, with areas of low (chance of flooding of between 0.1% and 1% AEP), medium (chance of flooding of between 1% and 3.3% AEP) and high risk (chance of flooding of greater than 3.3% AEP) generally associated flow pathways following topographic low points including drains and agricultural ditches.
- Flooding from groundwater – the BGS ‘Susceptibility to Groundwater Flooding’ indicates that the Solar and Energy Storage Park is categorised as having a ‘limited potential for groundwater flooding to occur’ for the most part, whilst the majority of the Grid Connection Corridor is classified as having the ‘potential for groundwater flooding to occur at the surface’.
- Flooding from sewers – considered very low risk based on the paucity of assets shown within Order limits by the Anglian Water and Severn Trent Water Drainage and Water Plans.
- Flooding from artificial sources – the Scheme is considered at low risk from reservoir flooding given the requirements of the Reservoirs Act 1975 to ensure reservoirs are properly maintained.

9.8 Potential Impacts

9.8.1 A number of activities during construction, operation and maintenance, and decommissioning phases, are likely to generate impacts, which have the potential to affect the water environment, if unmitigated. The impacts and effects (both beneficial and adverse) are outlined in the sections below. The proposed activities have been assessed in Section 9.10 following consideration of the embedded mitigation measures as described in Section 9.9.

Construction (assumed to be 2025-2027)

9.8.2 Many activities during construction and decommissioning phases are likely to generate impacts which have the potential to affect the water environment, if unmitigated.

9.8.3 The greatest risks of adverse impacts during construction and decommissioning are in the vicinity of the watercourses, waterbodies and numerous small ponds present in the study area, which may be directly affected by the Scheme (and potentially local groundwater sources).

9.8.4 Overall, during the construction phase the following adverse impacts have the potential to occur:

- Pollution of surface or groundwater due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals, or through

uncontrolled site run-off and foul waste water, or break out of drilling fluids when crossing watercourses using non-intrusive techniques;
- Potential impact on groundwater quality from piling and dewatering operations associated with watercourse crossings;
- Temporary impacts on sediment dynamics and hydromorphology within watercourses and waterbodies, e.g. where new crossings are required due to construction works to lay cables;
- Temporary changes in flood risk from changes in surface water runoff and exacerbation of localised flooding, due to deposition of silt, sediment in drains and ditches;
- Temporary changes in flood risk due to the construction of solar PV panels, site compound and storage facilities, which alter the surface water runoff from the Scheme; and
- Potential impacts on local water supplies.

Operation (assumed to be 2028-2088)

9.8.5 During the operation phase the following adverse impacts have the potential to occur:

- Impacts on water quality in affected water bodies that may receive surface water run-off or be at risk of chemical spillages from supporting infrastructure (e.g. substations, battery stores, solar stations, local site offices and car parking etc. and including the use of fire-water) and maintenance activities;
- Potential for reduced chemical loading of watercourses associated with the change in land use and the possible cessation of nitrate, pesticide, herbicide and insecticide applications on arable fields, which would be beneficial;
- Impacts on groundwater quality from creation of new pollutant pathways along any piled foundations;
- Impacts on flow in watercourses from structures impeding groundwater flow and baseflow to watercourses; including Solar PV struts, BESS and substation foundations, cable routes;
- Impacts on hydromorphology within watercourses and waterbodies where new crossings or drainage outfalls are required;
- Impacts on flood risk from increased runoff from new impervious areas across the site;
- Potential impacts on hydrology as a result of the Scheme by changing the way water infiltrates into the ground; and
- Potential for reduced irrigation of crops, if it is confirmed that water is abstracted locally for this purpose at the ES stage.

Decommissioning (assumed for the purpose of the assessment to be up to 48 months, not earlier than 2088)

9.8.6 Potential impacts from the decommissioning of the Scheme are similar in nature to those during construction, as some groundwork would be required to remove infrastructure installed. Ducting beneath watercourses is likely to remain in-situ but the cables removed.

Gate Burton ENERGY PARK

9.9 Embedded Mitigation Measures

9.9.1 The Scheme has been designed, as far as possible, to avoid and minimise impacts and effects on the water environment through the process of design development, and by embedding measures into the design of the Scheme.

9.9.2 A number of standard and embedded measures have been identified, which would be implemented during construction to manage the impacts and reduce the effects that the construction of the Scheme would have on the water environment.

Embedded Mitigation

9.9.3 The construction of the Scheme will take place in accordance with a Construction Environmental Management Plan (CEMP). The CEMP details the measures that would be undertaken during construction to mitigate the temporary effects on the water environment. A **Framework CEMP** is included in in the DCO application **[EN010131/APP/7.3]** and is secured through a requirement of the DCO*.* The Framework CEMP provides the structure and content for the detailed CEMP, which will be completed once a contractor is appointed..

9.9.4 The Framework CEMP comprises good practice methods that are established and effective measures to which the development will be committed through the development consent. The measures within the Framework CEMP focus on managing the risk of pollution to surface waters and the groundwater environment. It also considers the management of activities within floodplain areas (i.e. kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable).

9.9.5 The CEMP will be reviewed, revised and updated as the project progresses to ensure all potential impacts and residual effects are considered and addressed as far as practicable, in keeping with available good practice at that point in time. The principles of the mitigation measures set out below are the minimum standards that will be implemented. However, it is acknowledged that for some issues, there are multiple ways in which they may be addressed and methods of dealing with pollutant risk will be continually reviewed and adapted as construction works progress (e.g. the management of construction site runoff containing excessive levels of fine sediments).

9.9.6 The Framework CEMP is a standard procedure for the Scheme and describes the principles for the protection of the water environment during construction. The final CEMP will be supported by a Water Management Plan (WMP), that will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction. The potential for adverse impacts would be minimised by the adoption of the general mitigation measures outlined below, which will be described in the WMP and CEMP.

9.9.7 The high voltage cables associated with the Grid Connection Corridor will be below ground, requiring trenching typically of 2.5m depth. Underground techniques (such as HDD) will be used to install power cables beneath the River Trent, and would be at a maximum depth of 25 m below the bed, subject to design and ground conditions, to avoid impacting the channel or the bed. HDD beneath smaller watercourses would be a minimum of 2m below the watercourse bed. Where underground techniques are not feasible, crossings will be installed using open-cut techniques. In such cases, water flow would be maintained (e.g. by over-pumping). It will be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity.

9.9.8 The construction of the Scheme will be undertaken in accordance with good practice as detailed below. Where not disapplied through the DCO, temporary and relevant permanent consents/permits would be obtained where necessary, and these are outlined later in the chapter. The principal contractor will comply with any conditions imposed by any relevant permission.

Good Practice Guidance (Guidance for Pollution Prevention (GPP)

9.9.9 The following relevant GPPs have been released to date on the NetRegs website (Ref 9-70) and are listed below. While these are not regulatory guidance in England where the UK government website outlines regulatory requirements, it remains a useful resource for best practice. They are documented in the **Framework CEMP [EN010131/APP/7.3]** and secured through the final CEMP:

- GPP 1: Understanding your environmental responsibilities – good environmental practices;
- GPP 2: Above ground oil storage;
- GPP 3: Use and design of oil separators in surface water drainage systems;
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
- GPP 5: Works and maintenance in or near water;
- GPP 8: Safe storage and disposal of used oils;
- GPP 13: Vehicle washing and cleaning;
- GPP 19: Vehicles: Service and Repair;
- GPP 20: Dewatering underground ducts and chambers;
- GPP 21: Pollution Incident Response Plans;
- GPP22: Dealing with spills; and
- GPP26: Safe storage – drums and intermediate bulk containers.

9.9.10 Where new GPPs are yet to be published, previous Pollution Prevention Guidance (PPGs) still provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, although they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. Construction phase operations would be carried out in accordance with guidance contained within the following PPGs:

- PPG6: Working at construction and demolition sites (Ref 9-71);
- PPG7: Safe storage – the safe operation of refuelling facilities (Ref 9-72); and
- PPG18: Managing fire water and major spillages (Ref 9-73).

9.9.11 Additional good practice guidance for mitigation to protect the water environment can be found in the following key CIRIA documents and British Standards Institute documents:

- British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works (Ref 9-74);
- British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites (Ref 9-75);
- C753 (2015) The SuDS Manual (second edition) (Ref 9-30);
- C741 (2015) Environmental good practice on site guide (fourth edition) (Ref 9-76);
- C648 (2006) Control of water pollution from linear construction projects, technical guidance (Ref 9-77);
- C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (Ref 9-78);
- C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (Ref 9-79); and
- C736F Containment systems for prevention of pollution (Ref 9-80).

Management of Construction Site Runoff

9.9.12 Mitigation measures are described in detail below and would be adhered to during the construction phase of the Scheme. They apply equally to all components of the Scheme.

9.9.13 The construction of the Scheme would be in accordance with good practice as detailed in the various good practice guidance documents listed above.

9.9.14 The measures outlined below, which are included in the **Framework CEMP [EN010131/APP/7.3]**, will be required for the management of fine particulates in surface water runoff as a result of the construction activities:

- All reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in, and the pollution by sediment of, any existing watercourse, arising from construction activities. The measures will accord with the principles set out in industry guidelines including the CIRIA report 'C532: Control of water pollution from construction sites' (Ref 9-79) and CIRIA report ‘C648 Control of water pollution from linear construction sites’ (Ref 9-77). Measures may include use and maintenance of temporary lagoons, tanks, bunds and fabric silt fences or silt screens as well as consideration of the type of plant used;
- A temporary drainage system will be developed to prevent runoff contaminated with fine particulates from entering surface water drains without treatment. This will include identifying all land drains and waterbodies in the Order limits and ensuring that they are adequately protected using drain covers, sand bags, earth bunds, geotextile silt fences, straw bales, or proprietary treatment (e.g. lamella clarifiers);
- Site drainage, including surface runoff and dewatering effluents, will be discharged to sewers where possible and relevant permissions will be obtained from the sewerage or statutory undertaker. Discharge to watercourses will only be permitted where discharge consent or other relevant approval has been obtained (where necessary);

- Scheme drainage during construction will receive appropriate pollution control measures as agreed with the sewerage undertaker or the Environment Agency as appropriate. Holding or settling tanks, separators and other measures may be required, will be provided and maintained;
- The relevant sections of BS 6031: Code of Practice for Earthworks (Ref 9-74) will be followed for the general control of site drainage;
- Where practical, earthworks will be undertaken during the drier months of the year. When undertaking earth moving works periods of very wet weather will be avoided, where practical, to minimise the risk of generating runoff contaminated with fine particulates. However, it is likely that some working during wet weather periods will be unavoidable, in which case other mitigation measures (see below) will be implemented to control fine sediment laden runoff. Water may also be required to dampen earthworks during dry weather to reduce dust impacts, and any runoff generated will need to be appropriately managed by the Applicant's Contractor in accordance with the pollution prevention principles described in this chapter;
- To protect watercourses from fine sediment runoff, topsoil/subsoil will be stored a minimum of 20m from watercourses on flat lying land. Where this is not practicable, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth, or runoff prevented from draining to a watercourse without prior treatment;
- Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided. Construction site runoff will either be treated on site and discharged under a Water Discharge Activity Permit from the Environment Agency to Controlled Waters (potentially also including infiltration to ground) or to the nearest public sewer with sufficient capacity for treatment following discussions with Anglian Water, or removed from site for disposal at an appropriate and licensed waste facility;
- Equipment and plant are to be washed out and cleaned in designated areas within the Scheme compound where runoff can be isolated for treatment before disposal as outlined above;
- Mud deposits will be controlled at entry and exit points to the Site using wheel washing facilities and/or road sweepers operating during earthworks activities or other times as required;
- Debris and other material will be prevented from entering surface water drainage, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers and the presence of site security fencing; and
- The WMP (which will be produced post consent) will include details of pre, during and post-construction water quality monitoring. This will be based on a combination of visual observations and reviews of the Environment Agency's automatic water quality monitoring network.

Management of Spillage Risk

9.9.15 The measures outlined below will be implemented to manage the risk of accidental spillages within the Order limits and potential conveyance to nearby waterbodies via surface runoff or land drains. These measures are included in the **Framework CEMP [EN010131/APP/7.3]** and adopted during the construction works:

- Fuel will be stored and used in accordance with the Control of Substances Hazardous to Health Regulations 2002 (Ref 9-81), and the Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 9-12). Particular care will be taken with the delivery and use of concrete and cement as it is highly corrosive and alkaline;
- Fuel and other potentially polluting chemicals will either be in self-bunded leak proof containers or stored in a secure impermeable and bunded area (minimum capacity of 110% of the capacity of the containers);
- Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off site if possible or only at designated areas within the Scheme compound. Only construction equipment and vehicles free of all oil/fuel leaks will be permitted on the Order limits. Drip trays will be placed below static mechanical plant;
- All washing down of vehicles and equipment will take place in designated areas and wash water will be prevented from passing untreated into watercourses;
- All refuelling, oiling and greasing will take place above drip trays or on an impermeable surface which provides protection to underground strata and watercourses, and away from drains as far as reasonably practicable. Vehicles will not be left unattended during refuelling;
- As far as reasonably practicable, only biodegradable hydraulic oils will be used in equipment working in or over watercourses;
- All fixed plant used within the Order limits will be self-bunded;
- Mobile plant is to be in good working order, kept clean and fitted with plant 'nappies' at all times;
- The WMP – which will be produced post consent - will include details for pollution prevention and will be prepared and included alongside the final CEMP. Spill kits and oil absorbent material will be carried by mobile plant and located at high risk locations across the Order limits and regularly topped up. All construction workers will receive spill response training and tool box talks;
- The Order limits will be secure to prevent any vandalism that could lead to a pollution incident;
- Construction waste/debris are to be prevented from entering any surface water drainage or water body;
- Surface water drains on public roads trafficked by plant or within the construction compound will be identified and, where there is a risk that fine particulates or spillages could enter them, the drains will be protected (e.g. using covers or sand bags) or the road regularly cleaned by road sweeper;
- Suitable facilities for concrete wash water (e.g. geotextile wrapped sealed skip, container or earth bunded area) will be adequately contained, prevented from entering any drain, and removed from the Site for appropriate disposal at a suitably licenced waste facility; and
- Water quality monitoring of potentially impacted watercourses will be undertaken to ensure that pollution events can be detected against baseline conditions and can be dealt with effectively.

9.9.16 In addition, any site welfare facilities will be appropriately managed, and all foul waste disposed of by an appropriate contractor to a suitably licensed facility if it is not possible to connect to the public sewer.

Management of Flood Risk

9.9.17 The **Framework CEMP [EN010131/APP/7.3]** incorporates measures to prevent an increase in flood risk or pollution during the construction works, in addition to the provision of temporary settlement and drainage measures as detailed above.

9.9.18 Construction works undertaken adjacent to, beneath and within watercourses will comply with relevant guidance, including Environment Agency and Defra guidance documents. Refer to the FRA (**ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**) for further details.

9.9.19 The Framework CEMP incorporates best practice measures aimed at preventing an increase in flood risk during the construction works. Measures to be implemented include:

- Topsoil and other construction materials will be stored outside of the 1 in 100 year floodplain extent where feasible. If areas located within Flood Zone 2/3 are to be utilised for the storage of construction materials, this would be done in accordance with the applicable flood risk activity regulations, if required;
- Connectivity will be maintained between the floodplain and the adjacent watercourses, with no changes in ground levels within the floodplain as far as practicable;
- During the construction phase, the applicant will monitor weather forecasts on a monthly, weekly and daily basis, and plan works accordingly. For example, works in the channel of any watercourse will be avoided or halted were there to be a significant risk of high flows or flooding; and
- The construction laydown area site office and supervisor will be notified of any potential flood occurring by use of the Floodline Warnings Direct or equivalent service.

9.9.20 The Applicant's Contractor will be required to produce an Emergency Response Plan (secured via the CEMP) following receipt of DCO consent and prior to construction, which will provide details of the response to an impending flood and include:

- A 24-hour availability and ability to mobilise staff in the event of a flood warning;
- The removal of all plant, machinery and material capable of being mobilised in a flood for the duration of any holiday close down period where there is a forecast risk that the site may be flooded;
- Details of the evacuation and site close down procedures;
- Arrangements for removing any potentially hazardous material and anything capable of becoming entrained in floodwaters, from the temporary works areas;
- The applicant will sign up to Environment Agency flood warning alerts and describe in the Emergency Response Plan the actions it will take in the event of a flood event occurring. These actions will be hierarchical meaning

that as the risk increases the applicant will implement more stringent protection measures;

- If water is encountered during below ground construction, suitable de-watering methods will be used. Any groundwater dewatering required in excess of the exemption thresholds will be undertaken in line with the requirements of the Environment Agency (under the Water Resources Act 1991 as amended) (Ref 9-66) and the Environmental Permitting Regulations (2016) (Ref 9-82); and
- Safe egress routes and exits are to be maintained at all times when working in excavations. When working in excavations a banksman is to be present at all times.

Grid Connection Corridor: Horizontal Directional Drill or Similar

9.9.21 The electricity generated by the Scheme will be exported to the National Grid via a single 400kV circuit comprised of three buried cables from the onsite substation to Cottam substation. The total length of the Grid Connection Corridor is approximately 7.5km.

9.9.22 A set of avoidance areas (as shown on **ES Volume 3: Appendix 2-B (Figure 1) [EN010131/APP/3.3]** have been assigned along within the Grid Connection Corridor where watercourses would be crossed by a HDD methodology rather than intrusive, open-cut techniques. This will include the crossing of the WFD designated River Trent (approximate NGR SK 83100 80985), Marton Drain (approximate NGR SK 83693 81149) and Seymour Drain (approximate NGR SK 82087 80693).

9.9.23 The sections of the cables that will be installed via HDD will require launch and reception pits to be installed at distances between 200m and 500m (750m in one or two exceptional circumstances) along the HDD section of the route. Launch and exit pits will be sited outside the avoidance areas, and a minimum of 10m from watercourses (measured from the centre line of the watercourse as discussed above with the exception of the River Trent) and a minimum of 16m from the toe of flood defences.

9.9.24 For the purposes of assessment, up to a maximum of forty (40) launch and reception pit working areas for HDD are assumed within the Grid Connection Corridor. Each pit would be a maximum of 5m length x 5m width x 3m depth. A shoring system appropriate to the ground conditions would be used as appropriate to minimise water ingress into the pits. This may be timbers, sheet piling, or a modular system and would be chosen based on suitability for the site conditions. The ingress of any groundwater will be carefully managed through design of the send or receive pit, shoring method, and a pumping and treatment system. Excessive ingress of water would make the pit unsafe and thus it is important that ingress is minimised and that a suitable system of managing that water is implemented.

9.9.25 The maximum depth of drilling will be under the River Trent and would be up to a maximum of 25m beneath the bed. For all watercourses the depth of drilling beneath the watercourse bed would be a minimum of 2m, in keeping with IDB requirements. A maximum depth would be finalised based on site specific risk assessment at each crossing location in order to minimise groundwater interactions where possible.

9.9.26 In addition to the control and management measures for site runoff and spillage risk noted above, the methodology of the drilling, or other trenchless techniques, would include measures to minimise the risk to the environment. There are risks associated with the use of drilling muds and plant close to the channel. For example, although rare, without due care there is a risk that drilling muds can 'break out' into watercourses leading to pollution (known as 'hydraulic fracture' or 'frac-out'). A site-specific hydraulic fracture (frac-out) risk assessment would be developed prior to construction following further investigation of specific ground conditions at the crossing locations, and appropriate mitigation developed in line with best construction practice. There is also a need to manage drilling muds and wastewater so that this would not be spilt into the channel when working close to the banks of a watercourse. A frac-out risk assessment is secured as a DCO requirement (via the CEMP). A **Framework CEMP** is included in in the DCO application **[EN010131/APP/7.3]** and is secured through a requirement of the DCO.

9.9.27 Once the cable is installed beneath the watercourse the pits and any cable trenches will be backfilled to the original ground level and seeded to reduce the risk of runoff and fine sediments entering the watercourse. The drill fluids used within the drilling machine would be water based, such as naturally occurring bentonite clay. The fluid component of the drilling mud would be mains water, obtained from a nearby supply and tankered to site when required. There would be some recycling of drilling muds by the drilling plant used.

9.9.28 The bentonite within the drilling fluid is a naturally occurring mineral and enables the fluid to have sufficient viscosity to carry the cutting chips back to the surface machine whilst lubricating and keeping cool the drilling bit. Directional drilling, or other trenchless techniques, would be undertaken by a specialist contractor and the water column above the drill path would be continuously monitored during drilling. It is acknowledged that drill fluid leakage into a watercourse is not a common problem, particularly given the proposed depths. However, where there is an increased perceived risk (i.e. lack of drilling mud returns) the drilling/boring operation would be suspended, remediation action implemented, and subsequently the methodology for that crossing re-evaluated.

Grid Connection Corridor: Management of Risk to Morphology of Waterbodies from Open-Cut Crossings

9.9.29 There are currently six watercourse crossings that fall outside of the avoidance areas and here open-cut trenching will be required through the watercourse in order to install the cables. These are all small, unnamed ditches, with crossings at the following approximate locations: NGRs SK 84909 81957, SK 83355 81043, SK 82515 80888, SK 82228 80728, SK 81072 80170 and SK 80528 79272.

9.9.30 For the open cut sections of the Grid Connection Corridor, a maximum 25m wide construction corridor will include a single trench within which the 400kV connection will be installed. The trench will be a maximum of 1.1m wide and up to maximum 2.5m depth (refer to **ES Volume 1, Chapter 2: The Scheme [EN010131/APP/3.1]**). The 25m construction corridor will also include a running track along which vehicles and plant will be located as well as an area for temporary storage of excavated spoil (taking into account the necessary 10m buffer from watercourses and other requirements outlined in the CEMP, as discussed above).

9.9.31 A pre-works morphology survey of the channel of each watercourse to be crossed will be undertaken prior to construction. The pre-works survey is to ensure that there is a formal record of the condition of each watercourse prior to commencement of works to install cables beneath the channel. The survey is a precautionary measure so that should there be any unforeseen adverse impacts there is a record against which any remedial action can be determined.

9.9.32 At this stage it is assumed that where open-cut crossings are required that water flow would be maintained by damming and over pumping. Works should be carried out in the drier months where possible as this would reduce the risk of pollution propagating downstream, particularly given that these watercourses are considered ephemeral. Once the watercourses are reinstated, silt fences, geotextile matting or straw bales should be used initially to capture mobilised sediments until the watercourse has returned to a settled state. It will be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity. Regular observations of the watercourses will also be required post-works during vegetation re-establishment of the banks, especially following wet weather, to ensure that no adverse impacts have occurred. These requirements will be described in the WMP, which will be a technical appendix of the final CEMP.

Access Track Crossings of Watercourses

9.9.33 Access tracks will be constructed across the Solar and Energy Storage Park which will typically be 3.5m to 6m wide compacted stone tracks with 1:2 gradient slopes on either side. They will adhere to the appropriate 10m buffer from watercourses and ponds as outlined above, except where crossings are required. The internal road layout has been designed to avoid drainage ditch and watercourse crossings wherever possible. Strengthening or improving existing culverted crossings (which may require minor widening) will be undertaken. Where a new drainage ditch crossing is required, both a new culvert and an open span bridge crossing will be considered, with the type of crossing selected being determined based on site specific factors and in consultation with the relevant authority (generally the IDB/LLFA for the Solar and Energy Storage Park). For the purposes of assessment culverted crossings are assumed so that the worst-case scenario is assessed. Tracks should be permeable, and localised SuDS, such as swales and infiltration trenches, should be used to control runoff.

9.9.34 There are currently 17 proposed watercourse crossings for access tracks indicated within the Solar and Energy Storage Park. Seven of these are existing crossings that may require improvements, with the remaining 10 being new crossings. However, these crossings are not fixed within the DCO and it is expected that the final number of crossings at detailed design will be subject to change and could be reduced. However, they are all included in the assessment as a worst case.

9.9.35 Existing crossings are located at approximate NGRs SK 84968 85594, SK 84080 85168, SK 84960 83945, SK 86325 84235, SK 86395 83897, SK 86063 83677 and SK 85528 82979.

9.9.36 Indicative new crossings are located at the following approximate NGRs (although it should be remembered that these are not fixed at this stage): NGRs SK 85152 85428, SK 85483 84101, SK 86350 84081, SK 86209 84057, SK 86338 83490, SK 86513 83466, SK 86735 83429, SK 86863 83357, SK 86994 83337 and SK 85263 82877.

9.9.37 Based on site observations the existing crossings are ephemeral/intermittently flowing ditches without functional flows and numerous existing crossings are overly small or partially blocked with poor conveyance. As a precautionary worst case for the assessment, it is assumed that a maximum worst-case extension of 2m for each existing culvert would be required. These would be of environmentally sensitive design with a sunken bed to allow a natural substrate to develop and would aim to minimise changes in watercourse alignment and length as much as is feasible.

9.9.38 Where new culvert structures are required (assumed as a worst case), this will again follow the environmentally sensitive design principles. Culverts will be designed appropriately to maintain connectivity along watercourses for aquatic species and riparian mammals, where these are shown to be present. All culverts to convey watercourses will be set 150 mm below bed level to allow sedimentation and a naturalised bed to form, which will maintain longitudinal connectivity for aquatic fauna. Where new culverts are required, length-for-length watercourse enhancements are required in each case to mitigate the impacts, and to ensure compliance against WFD objectives (see **Appendix 9-E: Water Framework Directive Assessment [EN010131/APP/3.3]**). This length-for-length watercourse enhancement also applies to culvert extensions, and the requirements will be outlined in a WFD Mitigation and Enhancement Strategy.

9.9.39 Depending on the design of any watercourse crossings, floodplain compensation may be required on a ‘like for like’ and ‘level for level’ basis. Alterations to surface water flow pathways will also need to be considered and, if necessary, mitigated. This will include consideration of the culvert capacity, or span and soffit height of any open span bridge works to ensure no increase in flood risk.

9.9.40 With regard to the Grid Connection Corridor, a temporary construction access track will be required and this will be designed to minimise disturbance to the ground and to drainage lines and watercourses and adhere to the appropriate watercourse buffer of 10m (except where crossings are required). Where practicable, a temporary aluminium trackway will be used. In sections that are steep or particularly wet, a permeable access track will be installed. This is subject to detailed design.

9.9.41 The Grid Connection Corridor access track is assumed to require culverting of all watercourses that are also affecting by cable installation (with the exception of the River Trent) for a five year period as a worst case. This would include Marton Drain, Seymour Drain and the six drainage ditches which are to be crossed using open-cut cable installation as outlined above. As with culverts on the Solar and Energy Storage Park, the culvert design will aim to minimise changes in alignment and length as much as is feasible. Oversized pipes would be used to allow a naturalised substrate to form. Given that culverts are to be installed for five years, length for length watercourse enhancements have been committed to within the **Outline Design Principles [EN010131/APP/2.3]** in order to provide for overall benefits once the culverts have been removed. As with intrusive cable installation, it is assumed that during installation works flow would be maintained during the works by damming and over pumping.

9.9.42 The requirements for access track crossings are secured through the Design Principles.

Design

9.9.43 Detailed information on Scheme design and infrastructure is provided in **Chapter 2: The Scheme [EN010131/APP/3.1]**.

9.9.44 The Solar and Energy Storage Park is mostly located within Flood Zone 1 with the minimum height of the lowest part of the solar PV Panels to be 0.8m above ground level (AGL). Where flood depths exceed 500mm, up to a maximum of 800mm, the lowest part of the panel height may be raised further to 1.1 m (AGL) (i.e. 800mm + 300 mm freeboard). However, this will be limited as the layout has sought to avoid areas of flood risk. Mounting poles will generally be driven or screwed into the ground to a maximum depth of 2m.

9.9.45 The design of the Scheme has also considered the impact of surface water flood risk by excluding solar PV Panels (and other infrastructure) from areas of medium (chance of flooding of between 1% and 3.3% AEP) and high risk (chance of flooding of greater than 3.3% AEP). This includes several areas of land, predominantly in the southern and eastern regions of the Solar and Energy Storage Park, generally associated with flow pathways following topographic low points including drains and agricultural ditches. In addition, the design has ensured that the solar PV Panels will be off set from all watercourses and ponds by 10m. This will be measured from the centre line of the watercourse as determined from Ordnance Survey mapping. These embedded design mitigation measures are discussed further in **Chapter 3: Alternatives and Design Evolution [EN010131/APP/3.1]** and illustrated on **ES Volume 2: Figure 2-4 [EN010131/APP/3.2]**.

9.9.46 Indicative foundation depths associated with the development include maximum depths of 2m for the Solar and Energy Storage Park, maximum trench depth of 1.2m for low voltage distribution cables, maximum depth of 2m for the BESS Compound and a maximum depth of 2.5m for open trench excavation associated with the Grid Connection Corridor.

Drainage Strategy

9.9.47 An Outline Drainage Strategy is included in **ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**. The strategy aims to mimic the natural drainage conditions of the site as much as possible. It is considered that under existing conditions rainfall will mostly permeate into the ground where it falls and that any runoff generated within arable fields collects in local low spots where it infiltrates to ground or enters a watercourse as appropriate where the site drainage interacts with one.

9.9.48 The proposed solar PV panels will be held above ground individually on narrow diameter piled legs. This prevents sealing the ground with an impermeable surface beneath solar panels, thereby allowing rainfall/runoff to infiltrate to ground across the Solar and Energy Storage Park Site. As a result, it is considered that the Site's impermeable area will remain largely consistent with its pre-development state, except for where areas of hardstanding are required for other infrastructure such as the BESS Compound.

9.9.49 To prevent ponding occurring around the solar panels or overland flow routes directing runoff off site, a series of swales and infiltration basins will be constructed within the solar PV panel fields in identified low spots to collect and store runoff, allowing it to infiltrate to ground. The indicative locations of the proposed swales and detention basins are outlined within **ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**. Detailed drainage designs and SuDS feature locations will be developed post consent at detailed design stage.

9.9.50 The Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) has been developed with a conservative infiltration rate estimate across the Solar and Energy Storage Park of 1 x 10-5m/s, based on underlying geology. This will be reviewed at the detailed design phase following further ground investigation. The percentage of impermeable area for compound areas, the BESS Compound and on-site substations has not yet been confirmed; detailed layouts will be re-assessed post DCO consent to ensure the required attenuation is provided. Taking a conservative approach, at present it is assumed that the BESS Compound, site compounds and sub-stations are 100% impermeable. Increases to existing contributing area are to be balanced by infiltration techniques, with exceedance flows captured by surrounding swales and detention basins.

9.9.51 Attenuation will be required to temporarily store any excess peak surface water runoff generated within the Solar and Energy Storage Park before it is infiltrated to ground. Attenuation will be provided in the form of swales and infiltration basins. These features will be strategically located based on existing overland flow routes to capture runoff. The swales/infiltration basins will be 600 mm deep with no steeper than 1 in 3 side slopes. Check dams will be placed strategically within swales to optimise their storage potential on steeper slopes Where the attenuation lies within the solar field, the legs of the solar panel will be extended so that the solar panel lies above any potential flooding. The outline strategy presents indicative locations for attenuation, which will be refined during detail design, post DCO consent.

9.9.52 The attenuation features have been sized to accommodate the 1 in 100 year event plus a 40% allowance for climate change.

9.9.53 Transformers will be installed with suitable bunds to contain any oil spillage in case of an oil-leakage event. Bunds will be designed to contain at least 110% of the volume of the oil to ensure there is some tolerance to prevent breaching of the bund. Under normal conditions any rainwater collected within the bund will be removed by use of special, which automatically switches off if it detects the smallest presence of oil in the water. Pumps will be linked to control and monitoring equipment to raise alarms if oil is detected.

9.9.54 The BESS Compound will require fire water tanks to supress a fire, in the unlikely event that one break out in the BESS containers. Fire water runoff may contain particles from a fire. In the unlikely event of fire water being discharged, the runoff must be contained and tested/treated before being allowed to discharge to the proposed SuDS and then infiltrating to ground.

9.9.55 It is proposed to contain the fire water runoff within a bunded lagoon structure where it can be held and tested before either being released into the SuDS system or taken off site by a tanker for treatment elsewhere. The lagoon will then be cleaned of all contaminants.

9.9.56 The lagoon will be controlled by a penstock valve that can be automatically closed during a fire, i.e. under normal circumstances rainfall will be allowed to drain through the lagoon into the SuDS system.

Foul Drainage

9.9.57 It is proposed that given the low volumes of foul drainage generated (related to 14 operational staff) that wastewater treatment will be via self-contained independent non-mains domestic storage and / or a treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.

9.9.58 Should a connection to a foul sewer later be deemed more appropriate as an alternative option, Anglian Water would be consulted at the appropriate time. However, this is not expected to be the case.

9.9.59 As there would be no discharge of foul water to a watercourse, and only small volumes would either be discharged to a foul sewer indirectly via a suitable waste management contractor, or directly with Anglian Water's consent, no further assessment of foul waste from the Scheme has been undertaken.

Permits and Consents

9.9.60 Various water-related permissions may be required where it is not agreed with the relevant regulating authority to disapply them through the DCO **[EN010131/APP/3.2]**. These permissions may include:

- Land drainage consent(s) under section 23 of the Land Drainage Act 1991 (Ref 9-5) for works affecting the flow in ordinary watercourses;
- Flood risk activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 (Ref 9-82) in connection with crossing of the River Trent and any works within 8m of a main river and 16m of a flood defence (for a tidal main river);
- Water activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 (Ref 9-82) for temporary construction and permanent operational discharges;
- Trade effluent consent under the Water Industry Act 1991 (Ref 9-83) for the purposes of discharging trade effluent from welfare facilities during construction;
- Full or temporary water abstraction licence(s) under section 24 of the Water Resources Act 1991 (Ref 9-6) (if more than 20m3/d is to be

dewatered / over-pumped and exemptions do not apply) – see further detail below; and

- Temporary water impoundment licence under section 25 of the Water Resources Act 1991 (Ref 9-6) in connection with the laying of cables.

9.9.61 There is the potential for the need for either full or temporary water abstraction licence(s) from the Environment Agency for the abstraction of water from the launch and receive pits associated with the underground watercourse crossings or other excavations where groundwater may be encountered, other than where exemptions apply. A full licence is required when more than 20m^3 per day of water may need to be abstracted for more than 28 days. A temporary licence is applicable where the abstraction is less than 28 days. Where less than 20m^3 per day of water needs to be abstracted, no licence is required. However, in all circumstances it may be necessary to obtain a water activity permit(s) from the Environment Agency to discharge the water to ground or a watercourse if the water is considered to be 'unclean'.

Monitoring

9.9.62 The WMP will set out details of water quality monitoring to be undertaken during construction. Due to the level of risk posed by the construction works, this monitoring will consist of visual and olfactory observations plus in-situ testing using hand-held water quality meters only. The requirement for a WMP will be secured via the **Framework CEMP [EN010131/APP/7.3]**.

9.9.63 It is important that during the Scheme operation phase that there is a requirement for regular inspection and maintenance of the drainage systems, proposed SuDS and watercourse crossings. This will be carried out in accordance with good practice guidance. The drainage system will be designed in accordance with current guidance to ensure that the potential for siltation and blockages is minimised under normal operation. If there is any evidence of excessive erosion or sedimentation associated with new structures further actions will be considered to remedy that impact in as sustainable a way as possible. The maintenance and monitoring requirement for the drainage system will be secured via the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.2]**.

9.10 Assessment of Likely Impacts and Effects

9.10.1 Taking into account the embedded mitigation measures as detailed in Section 9.9 above, the potential for the Scheme to generate effects was assessed using the methodology as detailed in Section 9.6 of this Chapter.

9.10.2 The effects have been assessed following consideration of the potential impacts outlined in Section 9.8 and the embedded mitigation measures in Section 9.9.

Construction (assumed to be 2025 to 2027-28) and Decommissioning (assumed to be 2088 to 2089-2090)

Surface Water Quality – Construction Assessment

9.10.3 The Order limits cross the River Trent WFD watercourse, with the Solar and Energy Storage Park located to the east of the Trent and which extends as far as the Tributary of the Till WFD waterbody. The Grid Connection Corridor crosses beneath the River Trent and continues to the west to Cottam Substation, and would require crossings of the WFD designated waterbodies Marton Drain and Seymour Drain for cable installation as well as several smaller unnamed watercourses. There are numerous ponds and agricultural ditches across the study area (refer to **ES Volume 2: Figure 9-1 [EN010131/APP/3.2]**).

9.10.4 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff impact from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna.

9.10.5 Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation. Other potential sources of fine sediment during construction works include water runoff from earth stockpiles, dewatering of excavations (surface and groundwater), mud deposited on site and local access roads, and that which is generated by the construction works themselves or from vehicle washing.

9.10.6 Generally, excessive fine sediment in runoff is chemically inert and affects the water environment through smothering riverbeds and plants, temporarily changing water quality (e.g. increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion or irritation).

9.10.7 During construction, fuel, hydraulic fluids, solvents, grouts, paints and detergents and other potentially polluting substances will be stored and/or used on-site. Leaks and spillages of these substances could pollute the nearby surface watercourses if their use or removal is not carefully controlled and spillages enter existing flow pathways or waterbodies directly. Like excessive fine sediment in construction site runoff, the risk is greatest where works occur close to and within waterbodies.

9.10.8 The majority of construction works across the Order limits are buffered from watercourses and on relatively flat topography. As such, the risk to watercourses within the study area from construction activities is considered generally low. The greater risks of adverse impacts are where direct works are required within a watercourse, or works in very close proximity.

9.10.9 During construction, all works will be carried out in accordance with the mitigation measures set out in the **Framework CEMP [EN010131/APP/7.3]** which will be developed into a final CEMP and WMP by the appointed contractor. The implementation of standard mitigation measures will help avoid or reduce any potential adverse effects on surface water quality during construction.

9.10.10 In terms of direct works to watercourses, numerous access track crossings are required to be installed across the Solar and Energy Storage Park. These are all to unnamed agricultural ditches with the exception of the named watercourse Causeway Drain. Indicative access track routes have suggested that up to 17 crossings may be required (See Section 9.9), although some of these are at existing locations (7 of the 17), and the detailed design phase will endeavour to decrease the requirement for crossings. All new crossings are assumed as a worst case to be culverts (of maximum 6m length each) although each will be subject to site specific detailed design which may require the use of bailey bridges. Existing crossings are assumed as a worst case to require an extension of up to 2m. Where these culverted crossings are required there would clearly be an unavoidable need to work directly within the watercourse channel in each case.

9.10.11 The affected agricultural ditches are ephemeral/intermittently flowing and when visited on site in September 2021 and May 2022 they were generally dry or had ponded standing water that was not flowing at the crossing locations. Nevertheless, some of these drains are known to carry significant amounts of water at certain times to the year, and so when flowing the potential for adverse water quality impacts exists from runoff containing fine sediments and chemical spillages relating to use of plant adjacent to and within the watercourses. To mitigate this, works should be carried out in the drier months where possible as this would reduce the risk of pollution propagating downstream, particularly in the case of ephemeral watercourses. Flow would be maintained by damming and over pumping around the structure installation, with reconnection only made once the structure is complete. Once the watercourses are reinstated, silt fences, geotextile matting or straw bales should be used initially to capture mobilised sediments until the watercourse has returned to a settled state. It will be a requirement that the watercourses are reinstated as found around each culvert and water quality monitoring will be undertaken prior to, during, and following on from the construction activity. These requirements will be described in the WMP.

9.10.12 Given the limited potential for conveyance in these generally dry watercourses any impact would be expected to remain localised. Throughout the works for the crossings, best practice mitigation measures as outlined in the final CEMP and WMP would be implemented. Taking this mitigation into account the impact on water quality of the affected watercourses would be expected to be temporary and minor, with no impact to downstream receptors from installation of these culverts across the Solar and Energy Storage Park.

9.10.13 The Grid Connection Corridor will be constructed beneath the channel of the River Trent and numerous other smaller watercourses between the Solar and Energy Storage Park and Cottam Substation. HDD techniques are proposed to be used beneath the River Trent and for the ‘avoidance areas’ which includes Seymour Drain, Marton Drain and several unnamed watercourses. This approach would not disturb the watercourse bed. However, launch and receiving pits would be required for drilling, no closer than 10m from the water’s/channel edge. As such, there would be a risk of sediment mobilisation in runoff and for chemical spillages to occur that could enter the channel if not managed accordingly. There is also a chance of ‘frac-out’ events (i.e. hydraulic fluid break out) from drilling to the watercourse if not appropriately mitigated for site specific conditions. A site-specific hydraulic fracture risk assessment will be produced prior to commencing works to define the mitigation required based on ground conditions. Water quality monitoring will also be undertaken prior to, during, and following on from the construction activity to ensure any spillages or other pollution is identified. These mitigation requirements will be outlined in a WMP. Given the non-intrusive nature of the works and the mitigation that is in place, the risk to water quality of the River Trent, Seymour Drain, Marton Drain and the affected agricultural ditches is considered negligible from HDD cable installation.

9.10.14 It is currently anticipated that six crossings are required of unnamed agricultural ditches for the Grid Connection Corridor to Cottam Substation outside of the avoidance areas (see Section 9.9). These watercourses would be subject to an intrusive open-cut cable installation which will require unavoidable works within the channel, with potential for adverse water quality impacts. It is also currently assumed as a worst case that all watercourses along the Grid Connection Corridor, with the exception of the River Trent, will also require a temporary culvert to enable access track crossings (with the culvert remaining in place for up to 5 years). This culverting would be required for the WFD designated Marton Drain and Seymour Drain, as well as all unnamed agricultural ditches that are crossed by the cable installation. For intrusive cable installation and culverting for access tracks, flow would be maintained in all cases during construction by damming and over pumping. Works should be carried out in the drier months where possible. Silt fences, geotextile matting or straw bales would be used initially once the channel is reinstated to capture mobilised sediments until the watercourse has returned to a settled state. It will be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity. These requirements will be described in the WMP. With these measures in place, only a temporary and minor adverse impact to water quality would be expected, with no impact on downstream receptors.

9.10.15 Aside from direct works for watercourse crossings, the Scheme design includes a 10m buffer around all watercourses and ponds. With the exception of the Grid Connection Corridor cable crossings and access track crossings there should be no further requirement to work in immediate proximity to watercourses or ponds.

9.10.16 With regard to the River Trent, there is considered to be negligible potential for impact from works to install a cable beneath it given the mitigation measures in place, the distance of the launch/receiving pits from the banks and the size of the watercourse which would dilute and disperse any pollutants. For the very high importance River Trent, a negligible magnitude impact results in a temporary **slight adverse** effect (**not significant**). For the HDD cable installation beneath the high importance Seymour Drain and Marton Drain, given the embedded mitigation including the buffer from the watercourse, a negligible impact would also be expected. This would result in **a slight adverse** effect **(not significant)**. HDD beneath the ‘low importance’ unnamed drainage ditches would also give a negligible impact given the mitigation, resulting in a **neutral** effect **(not significant**).

9.10.17 The culverted watercourse crossings across the Solar and Energy Park are all to be installed on agricultural ditches of low importance for water quality. The only exception is Causeway Drain which will be crossed and which is a medium importance receptor for water quality. There is likely to be unavoidable short term, temporary adverse impacts given the need to work directly in the channel which will affect the hydrological and sediment regimes (and thereby water quality) during construction. There is also a risk of runoff laden with sediment or accidental spillages entering the watercourse. However, given mitigation measures in place, including over-pumping or fluming of the flow, and implementation of best practice measures which will be outlined in the Framework CEMP and WMP, this would be a temporary and localised minor adverse impact in terms of water quality. The minor impact would result in a temporary **slight** effect (**not significant**) for Causeway Drain and the unnamed agricultural ditches.

9.10.18 Similarly, for the culverted watercourse crossings along the Grid Connection Corridor, a temporary minor adverse impact has been predicted to each. For the high importance (for water quality) Marton Drain and Seymour Drain this results in a temporary **slight** effect **(not significant)**, and for the agricultural ditches which are of low importance for water quality this also results in a temporary **slight** effect (**not significant**).

9.10.19 For the six intrusive open cut crossings for the Grid Connection Corridor there would again be short term, temporary adverse impacts on water quality. There would be a risk of sediment disturbance when trenching through the channel, plus potential for construction runoff and spillages entering the watercourse given the direct nature of the work. However, given mitigation measures in place, including over-pumping or fluming of the flow, reinstatement as found and implementation of best practice measures which will be outlined in the Framework CEMP and WMP, this would be a temporary and localised minor adverse impact in terms of water quality. For the low importance agricultural ditches this would result in a **neutral** effect (**not significant**).

9.10.20 Given that no other watercourses or waterbodies will be directly affected by the construction works, and that the Scheme has buffer zones around watercourses and ponds, a negligible indirect impact is predicted for all other surface water receptors in the study area from site runoff and chemical spillages (as they may receive runoff indirectly from permitted site discharges of treated runoff). For the high importance River Till, Tributary of the Till and Skellingthorpe Main Drain this gives a temporary **slight adverse** effect (**not significant**). For the medium importance Padmoor Drain, Mother Drain, Causeway Drain, Littleborough Lagoon, Coates Wetland and Cottam Wetland this gives a **neutral** effect (**not significant**). For the low importance agricultural drainage ditches (those that aren't directly crossed) and small ponds, this results in a **neutral** effect (**not significant**).

Surface Waterbodies – Morphology

9.10.21 The open-cut installation of the cable for the Grid Connection Corridor will require intrusive works across six drainage ditches (see details in Section

9.9), all of which are of low importance for morphology due to being artificially straight, trapezoidal channels lacking significant geomorphic and bedform features. For open-cut crossings, a pre-works morphological survey will be undertaken at each crossing point. The cables will be buried at sufficient depth to prevent exposure and the flow over-pumped or flumed during the works to minimise the risk of water pollution being carried downstream. However, there will unavoidably be short term, temporary adverse impacts on the watercourse and riparian habitats, and the hydrological and sediment regimes during construction. These impacts would be very localised and short in duration, with the channels reinstated taking into account the pre-works morphological condition.

9.10.22 Similarly, the temporary culverts of Marton Drain, Seymour Drain and several unnamed agricultural ditches for construction access tracks for the Grid Connection Corridor, will also require intrusive works and physical impact to watercourses. All affected watercourses are of low importance for morphology. Nonetheless, for these watercourses there would be unavoidable direct loss of riparian, bank and bed habitats where they are replaced by culverts for up to a 5 year period. The structures may also hamper movement of mammals and are likely to interrupt continuity of the natural hydraulic and sediment regimes. However, the design will aim to minimise changes in watercourse alignment and length as much as is feasible, and be environmentally sensitive with a sunken bed and provisions made for mammal passage where appropriate. An equivalent length of watercourse enhancement will be delivered for every metre of watercourse lost to a culvert, with this enhancement to be defined within a WFD Mitigation and Enhancement Strategy. This mitigation is secured by the **Outline Design Principles [EN010131/APP/2.3]**. After the construction period, the culverts would be removed and the watercourse returned to a condition resembling that documented during a pre-works morphological survey.

9.10.23 Overall, physical works are considered to give a localised moderate adverse impact against hydromorphological status for all open cut cable installation locations and for all culverted crossings for access tracks along the Grid Connection Corridor. As low importance receptors this results in a **slight adverse effect (not significant)** for Marton Drain, Seymour Drain and the affected unnamed drainage ditches. This impact would be minimal at the scale of each wider waterbody once installation of the cables and reinstatement of the watercourse is complete, and with culverts having been removed and watercourse enhancement implemented following construction.

9.10.24 Culverts associated with access tracks on the Solar and Energy Storage Park are assessed under operation given that they will be in place for the lifetime of the Scheme.

Groundwater – Construction Impact Assessment

9.10.25 As indicated in **Chapter 2: The Scheme [EN010131/APP/3.1]** the Solar PV Panels will be attached to a PV Mounting Structure which combine to form PV Tables. The PV Mounting Structures would be piled to an indicative maximum depth of 2m. Indicative foundation depths associated with the development include maximum depths of 2m for the Solar and Energy Storage Park, maximum trench depth of 1.2m for low voltage distribution cables, maximum depth of 2m for the BESS Compound and a depth of 2.5m for open trench excavation associated with the Grid Connection Corridor cables.

9.10.26 On the basis of existing borehole scans available on the Geoindex website (Ref 9-50), groundwater levels are variable across the area, with some groundwater encountered at relatively shallow levels less than 2m below the ground, for instance towards Kexby and Cottam (see Section 9.7). Alluvium deposits may also carry water at relatively shallow depths, although these are predominantly around watercourses where there will be no construction aside from the crossings for access tracks and cable routes.

9.10.27 As no continuous foundations are in the design and given that groundwater is anticipated to be below 2m across the majority of the Order limits, the shallow, regularly spaced discrete strut PV Panel foundations, and the substation and BESS foundations are considered to have a negligible impact on groundwater flow. As such, no impediment to baseflow in the River Trent, River Till, Tributary of the Till, Marton Drain, Seymour Drain, Skellingthrope Main Drain or their tributaries are anticipated.

9.10.28 Cable routes beneath watercourses are anticipated to be below the water table over part of their routes. The profile of the cable ducting is considered to be small compared to the spatial and vertical extent of the secondary aquifers, and therefore is considered to have a negligible impact on groundwater flow. As such, no impediments to baseflow in the River Trent or small watercourses on the Order limits are anticipated.

9.10.29 Details of groundwater abstractions and PWS have indicated that there are none recorded within the Solar and Energy Storage Park, although there is one groundwater abstraction in the wider study area associated with river gravels south of Cottam. Given distance from the Scheme itself and that the Grid Connection Corridor would have negligible impacts on groundwater flow, negligible impact is predicted to groundwater abstractions. Overall, as a medium importance receptor, a negligible impact on groundwater flow and abstractions is a **neutral** effect (**not significant**).

9.10.30 Construction works to install cables beneath the River Trent using drilling or boring techniques would involve a temporary pit either side of the watercourse (>10m measured from the water's/channel edge under normal flows for the River Trent) as well as regularly spaced jointing pits along the length of the Grid Connection Corridor (these pits would be located >10m from the centreline of all watercourses other than the Trent). The maximum size of each pit would be 5m length x 5m width x 3m depth.

9.10.31 As outlined above there may be shallow groundwater in parts of the Order limits, and so there is potential for groundwater ingress to the pits. This would be managed following standard construction techniques potentially including pumping, damming or shoring up the pits with sheet piling. A temporary abstraction licence is required from the Environment Agency when abstracting more than 20 m^3/day of water per day lasting less than 28 days. Any discharge of groundwater to the watercourse may also require a discharge consent from the Environment Agency if it is considered to be 'unclean' and the conditions of the Environment Agency's Regulatory Position Statement

'Temporary dewatering from excavations to surface water' (April 2021) (Ref 9-84) cannot be met.

9.10.32 The pits would be backfilled with the original excavated material upon completion and would not affect groundwater flow in the longer term. Given the potential to encounter groundwater temporarily during construction, but that it would be appropriately managed in line with any required permit conditions and best industry practice as outlined in the **Framework CEMP [EN010131/APP/7.3]**, there is the likelihood of a short term, temporary minor adverse impact on groundwater flow. For the medium importance groundwater aquifer this results in a **slight adverse** effect (**not significant**).

9.10.33 The study area is not known to have a significant history of potentially contaminating land uses such as landfill, although there are areas of infilled land and made ground associated with historic quarries and pits. The installation of the module structures to a maximum depth of 2m below ground, and other foundations depths as outlined above (maximum 2m depth) are not considered at this stage to create a significant risk of mobilising contaminants, creating a contaminant pathway or risking infiltration to the water table. A standalone, site specific hydraulic fracture risk assessment will be produced prior to drilling the cable crossings, as is standard practice, to mitigate any water quality deterioration from the drilling process. This is secured through the **Framework CEMP [EN010131/APP/7.3]**. Consequently, water quality impacts to rivers receiving baseflow, and groundwater abstractions down gradient are considered to be negligible, and a **neutral** effect (**not significant**).

Solar and Energy Storage Park: Flood Risk

9.10.34 A Flood Risk Assessment is included in **ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**. A summary of flood risk to the Solar and Energy Storage Park is outlined below.

Fluvial Flood Risk

9.10.35 The majority of the Solar and Energy Storage Park is in Flood Zone 1 (see **ES Volume 2**: **Figure 9-2 [EN010131/APP/3.2]**) and considered to be at low risk from fluvial flooding (Table 9-11). However, construction activity in the north east corner and eastern side of the site will involve works in areas of Flood Zone 2 and 3. Should a fluvial flood event occur during construction, this could be a potential high risk to construction workers in the immediate vicinity (very high importance receptors). The baseline flood risk could be exacerbated during construction works by the temporary increase in the rate and volume of surface water runoff from an increase in impermeable areas caused by the compaction of soils and the presence of stockpiled materials. In addition, equipment may also be washed downstream where it may block the channel and lead to or increase the risk of flooding.

9.10.36 With the implementation of standard construction methods and mitigation as described in Section 9.9, this fluvial flood risk can be effectively managed (for example by monitoring weather forecasts and Environment Agency flood warnings, by undertaking works close to watercourses during periods of dry weather by ensuring an adequate temporary drainage system is in place and maintained throughout the construction phase and avoiding stockpiling material on floodplains).

9.10.37 As such, the magnitude of flooding from these sources during construction, on site and further downstream, is considered to be very low resulting in a negligible impact, which as construction workers are a very high importance receptor gives a **slight adverse** effect (**not significant**).

Surface Water (Pluvial) Flood Risk

9.10.38 The Solar and Energy Storage Park is in general at a very low risk of surface water flooding, although in some areas (mainly associated with watercourses and localised shallow patches) there are areas of low, medium and high risk as outlined in the baseline and shown in **ES Volume 2: Figure 9-2 [EN010131/APP/3.2]**.

9.10.39 During construction, the following adverse impacts may occur:

- Existing surface water flow paths may be disrupted and altered due to site clearance, earthworks, and excavation work. The exposure and compaction of bare ground and the construction of new embankments and impermeable surfaces may increase the rates and volume of runoff and increase the risk from surface water flooding;
- Temporary changes in flood risk from changes in surface water runoff (e.g. exacerbation of localised flooding due to deposition of silt, sediment in drains, ditches); and
- Changes in flood risk due to the construction of solar PV panels and site compound and storage facilities, which alter the surface water runoff from the site.

9.10.40 As stated within Section 9.9, Embedded Design Mitigation, the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) will ensure that any alteration of surface water runoff as a result of the construction of the solar PV panels, compounds and battery storage units will be mitigated by the construction of SuDS (e.g. swales and detention basins).

9.10.41 Construction activities will take place with the Final CEMP in place (building on the **Framework CEMP** provided in the DCO application **[EN010131/APP/7.3]**) to ensure no exacerbation of localised flooding from deposition of silt or sediment in drainage and ditches.

9.10.42 Therefore, the impact during construction on surface water flooding and flood risk, to and from the Scheme to other developments outside of the Scheme extents, is considered to result in no change, which would result in a **neutral** effect to very high importance construction workers (**not significant**).

Flood Risk from Groundwater

9.10.43 The BGS nationwide 'Susceptibility to Groundwater flooding' mapping indicates that the majority of the Solar and Energy Storage Park is classified as having a 'limited potential for groundwater flooding to occur' with isolated areas of potential for groundwater flooding to occur at surface around Kexby Lane and Clay Farm (NGR: SK 85090 83079).

9.10.44 Based on the above information, the impact during construction on groundwater flooding and flood risk, to and from the Scheme to other developments outside of the Scheme extents, is considered to result in no change, which would result in a **neutral** effect to very high importance construction workers (**not significant**).

Flood Risk from Artificial Sources

9.10.45 It is not envisaged the flood risk from drainage infrastructure (e.g. sewers) will increase from the existing situation with the construction of the Scheme. No new connections to foul water infrastructure are considered to be required for the Scheme, as outlined in Section 9.9.

9.10.46 There is not envisaged to be any impact on flood risk from artificial sources either on or off site during construction (i.e., no change), and so no effect to on-or off-site receptors (e.g. ecological or heritage receptors). As such, there is a **neutral** effect (**not significant**) to very high importance construction workers from flood risk from drainage infrastructure and artificial sources.

Grid Connection Corridor: Flood Risk

9.10.47 A Flood Risk Assessment is included in **ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**. A summary of flood risk to the Grid Connection Corridor is outlined below.

Fluvial Flood Risk

9.10.48 The majority of the Grid Connection Corridor is in Flood Zone 3 and considered to be at high risk (Table 9-11 and **ES Volume 2: Figure 9-2 [EN010131/APP/3.2]**). Should a fluvial flood event occur during construction, this could be a potential high risk to construction workers in the immediate vicinity (very high importance receptors). The baseline flood risk could be exacerbated during construction works by the temporary increase in the rate and volume of surface water runoff from an increase in impermeable areas caused by the compaction of soils and the presence of stockpiled materials. In addition, equipment may also be washed downstream where it may block the channel and lead to or increase the risk of flooding.

9.10.49 With the implementation of standard construction methods and mitigation as described in Section 9.9, this fluvial flood risk can be effectively managed as outlined above. There is also a low likelihood of significant flooding during construction occurring. The probability of a 1% AEP event occurring over the 48 month construction period can be determined using the risk of exceedance equation (Ref 9-85). Based on this, there is a 4% chance of the 1% AEP event occurring (i.e. a 96% chance of it not occurring) and therefore the flood risk during the construction period is considered low.

9.10.50 As stated within Section 9.9 Embedded Design Mitigation, the Grid Connection Corridor will cross under the River Trent and adjacent flood defences. This will ensure there will be no impact on the banks and bed of the watercourse, and therefore no effect on the flow regime or flooding potential of the watercourse.

9.10.51 Overall, the magnitude of flooding from fluvial sources during construction, on site and further downstream, is considered to be very low resulting in a negligible impact, and a **slight adverse** effect (**not significant**) to very high importance construction workers.

Surface Water (Pluvial) Flood Risk

9.10.52 The Grid Connection Corridor is in general at a very low risk of surface water flooding, although in some areas (mainly associated with watercourses and localised shallow patches) there are areas of low, medium and high risk as outlined in the baseline and shown in **ES Volume 2: Figure 9-3 [EN010131/APP/3.2]**. During the construction phase the following adverse impacts may occur:

- Temporary changes to flood risk from changes in surface water runoff (e.g. disruption of stream flows due to deposition of silt, sediment in drains, ditches); and
- Changes in flood risk due to the construction of the Grid Connection Corridor crossing the River Trent.

9.10.53 Construction activities in the area of the river will take place with the CEMP in place to ensure no exacerbation of localised flooding from deposition or silt or sediment in drainage and ditches.

9.10.54 The FRA (**ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**) considers pluvial flood risk from the Grid Connection Corridors. With the mitigation in place, flood risk is considered low.

9.10.55 Therefore, the impact of construction of Grid Connection Corridor on pluvial flood risk, from and to the development, is considered to result in a temporary no change impact, which results in a **neutral** effect (**not significant**) on very high importance construction workers.

Flood Risk from Groundwater

9.10.56 The FRA (**ES Volume 3: Appendix 9-D [EN010131/APP/3.3]**) considers groundwater flood risk from the Grid Connection Corridors. With the mitigation in place, flood risk is considered low.

9.10.57 Therefore, the impact of construction of Grid Connection Corridor on groundwater flood risk, to and from the development, is considered to result in a no change impact, which results in a **neutral** effect (**not significant**) on very high importance construction workers.

Artificial

9.10.58 There is not envisaged to be any impact on flood risk from artificial sources either on or off site, and so no adverse effect to on-or off-site receptors (e.g. ecological or heritage receptors). Overall, there is a **neutral** effect (**not significant**) on very high importance construction workers from drainage infrastructure and artificial sources.

Operation

Operation Impact to Water Quality

9.10.59 The drainage arrangements for the Scheme propose to attenuate surface water runoff and contain spillages from the operational area of the Solar and Energy Storage Park, whilst minimising flood risk to the site and surrounding areas (see Section 9.9).

9.10.60 Surface water runoff would mainly be low risk roof or panel runoff. In addition to permanent structures, there would be runoff from hardstanding areas such as the BESS, onsite substation, permanent plant storage buildings, office/warehouse buildings, access tracks and car park.

9.10.61 The Solar and Energy Storage Park impermeable area will remain largely consistent with its pre-development state as PV Panels are elevated above ground. Runoff from the PV Panels will alter the existing routing of runoff. To prevent ponding occurring around the panels, a series of boundary and routing swales will be constructed to convey surface water runoff away from the panels and towards infiltration basins to ground.

9.10.62 Attenuation will be provided to temporarily store any excess peak surface water runoff generated within the Solar and Energy Storage Park before it is infiltrated to ground. Attenuation will be provided in the form of swales and infiltration basins which can accommodate flows from up to the 1 in 100 year design storm plus a 40% allowance for climate change. These SuDS also provide treatment for any contaminants collected on areas of hardstanding.

9.10.63 The SuDS Manual's Simple Index Approach (Ref 9-30) has been applied to demonstrate the suitability of the proposed SuDS treatment train for surface water runoff and spillages. The Medium Pollution Hazard Index has been adopted to assess runoff from the Scheme as a worst case scenario, as this is described in the SuDS Manual as, "*Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low-traffic roads and trunk roads/motorways*". While not directly applicable to the Scheme, given that there will be storage of batteries on site, this is deemed the most appropriate hazard index available. However, this is precautionary and in reality, there will be little traffic on site with infrequent change (i.e. estimated 14 workers in total). The battery storage area will have a specific drainage design and mitigation in case of fire (see Section 9.9).

9.10.64 Table 9-13 shows the pollutant hazard index score for different pollutants (total suspended solids, metals, and hydrocarbons) for the Medium Pollution Hazard Level, as outlined in the SuDS Manual (Ref 9-30).

9.10.65 The proposed treatment of swales and infiltration basins for the higher risk areas (e.g. car parks) for conveyance and treatment of surface water flows is included in Table 9-13 by way of a worst case example for the Scheme (areas with solar panels would clearly have significantly less potential to cause pollution via surface water runoff). Table 9-13 shows the treatment potential of the SuDS solution when compared against the medium pollution hazard index. To achieve a pass the total mitigation index must meet or surpass the pollution hazard index. Under the Simple Index Approach the effectivity of the second treatment component (i.e. attenuation pond) is considered to be 50% compared to the first treatment component (i.e. the swale). On this basis, the mitigation index (swale + infiltration basin at 50% efficiency) passes the indicative assessment for total suspended solids, metals, and hydrocarbons.

Table 9-13: Pollution Hazard Indices and the Total Pollutant Mitigation Index for each pollutant

Proposed Development Land Use	SuDS Train	Total Suspended Solids	Metals	Hydrocarbons
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low-traffic roads and trunk roads/motorway*s*	*Swale*	*0.5*	*0.6*	*0.6*
	Detention basin at 50% efficiency	*0.25*	*0.25*	*0.3*
	Pollution Hazard Index	0.7	0.6	0.7
	Total Mitigation Index	0.75 (Pass)	0.85 (Pass)	0.9 (Pass)
	Comment	The proposed treatment train passes the assessment in all cases. However, appropriate maintenance of the SuDS features will be required to ensure that they remain effective in the long term.		

9.10.66 As outlined in Section 9.9, transformers will be installed with suitable bunds to contain any oil spillage in case of an oil-leakage event. Bunds will be designed to contain at least 110% of the volume of the oil within the transformers. Should a spillage occur oil would be collected for off-site disposal at a licensed waste facility.

9.10.67 In the instance there is a small fire within the BESS area which cannot be directly contained, there may be potential for contaminated firewater runoff into the SuDS system. To mitigate this, the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) indicates that firewater would be contained in a bunded lagoon structure with a penstock. The penstock will then enable potentially contaminated suppression waters to be isolated and extracted in order to be suitably tested and disposed of offsite without entering the surrounding hydrological network. Following a fire event, the drainage network will require an assessment to confirm the absence of any contaminants prior to the penstock being released. The Scheme operator will be responsible for conducting a controlled flushing of the drainage network prior to the release of the penstock. This approach to mitigation is secured within the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**).

9.10.68 Should there be any other spillages on the BESS Compound such as battery leakage or spillage of fuel from the transformers then any contaminated runoff would be managed and intercepted by the penstock system, as with the firewater outlined above.

9.10.69 During operation, the Solar and Energy Storage Park would operate using best practice and comply with environmental legislation through the application of an **Outline Landscape and Ecological Management Plan**

(OLEMP) [EN010131/APP/7.10], including appropriate maintenance of SuDS and other drainage infrastructure.

9.10.70 It is anticipated that with the embedded mitigation of an appropriate drainage strategy mimicking natural flow status there would be no effect on flow pathways from runoff from the Scheme.

9.10.71 Overall, given the implementation of a Drainage Strategy including SuDS provision, there would be negligible impact to the receiving groundwater from operational surface water runoff. No operational runoff is directed to surface watercourses and so no direct or indirect impacts on any surface watercourses in terms of quality or flow would occur during operation of the Scheme. For the medium importance groundwater body, the negligible impact from operational runoff would result in a **neutral** effect (**not significant**).

9.10.72 As the land is being taken out of agricultural usage, it is considered there would a decrease in existing surface water runoff of agricultural additives to the land (be those nutrients in the form of phosphates and nitrates, or from pesticides, herbicides or insecticides). Taking land out of arable production may also have other benefits by reducing the risk of soil erosion and the need for local water abstraction for crop irrigation. However, although a beneficial impact, in the context of the whole catchment, it is considered this would not be a sufficiently large change to result in a significant effect on the waterbodies. There is considered to be no change in future baseline conditions to any watercourse. For the very high importance River Trent; high importance Marton Drain, Seymour Drain, Tributary of the Till, Till and Skellingthorpe Main Drain; medium importance Padmoor Drain and Causeway Drain; and low importance agricultural drainage ditches, this results in a **neutral** effect in all cases, which is **not significant**.

Surface Waterbodies – Morphological Assessment

9.10.73 For the agricultural ditches on the Solar and Energy Storage Park that are assumed to require culvert crossings for access tracks as a worst case (see Section 9.9 for details), there will be unavoidable direct loss of riparian, bank and bed habitats. This will be the case both where there are new culverts (assumed to be 6m in length as a worst case), or where existing culverts are widened and/or replaced (maximum extension considered to be 2m as a worst case). There may be further indirect losses through shading effects. The structures may also hamper movement of mammals and are likely to interrupt continuity of the natural hydraulic and sediment regimes, although it is notable that these are ephemeral/intermittently flowing watercourses. As outlined above, culvert design will aim to minimise changes in alignment and length as much as is feasible. The channel bed would be sunken to allow development of a naturalised bed and encourage ecological continuum, or oversized where they are pipe culverts to achieve a similar effect in terms of naturalised substrate. Length for length equivalent watercourse enhancement will be delivered for every metre of culvert installed, and will be described in a WFD Mitigation and Enhancement Strategy. This is secured within the DCO through the **Outline Design Principles [EN010131/APP/2.3]**.

9.10.74 In the case of existing culverts (of which there are seven), then given the lack of existing functional flows in these watercourses as outlined above, upgraded culverts may actually improve conveyance in comparison to existing pipe culverts many of which appeared during the site visit to be of an overly small diameter in comparison to the size of the drainage ditches.

9.10.75 Despite the mitigation approaches to softening the impacts of culverts and the delivery of equivalent length watercourse enhancement, a moderate adverse magnitude of impact to morphology is considered appropriate as a worst-case scenario from culverts within these agricultural ditches (including Causeway Drain). This is appropriate as part of the channel will be permanently lost and the impact of existing structures will be increased in some cases. For these low importance receptors (in terms of morphology) this results in a long term **slight adverse** effect (**not significant**).

9.10.76 Impacts to watercourses relating to access track culverts along the Grid Connection Corridor were assessed above as a construction impact given that they are short term in nature. On the other hand, culverts on the Solar and Energy Storage Park would be in place for the lifetime of the Scheme.

Groundwater Flow and Abstractions – Operation Impact Assessment

9.10.77 Operational risks to groundwater quality related to surface water runoff were assessed above.

9.10.78 It is likely that the reduction in arable farming across the Order limits will reduce the need for irrigation of crops. However, data regarding licensed abstractions available online (see Section 9.7) indicated that there are no groundwater abstractions in the Order limits and only one in the wider study area (which itself is not for irrigation), and therefore no impact is predicted with regard to reduced need for abstraction for irrigation.

9.10.79 As previously outlined, there would be negligible localised changes in the spatial distribution and quantity of recharge of groundwater across the Order limits, with only localised areas around the new areas of hardstanding such as at the BESS Compound and sub-stations.

9.10.80 Construction of the new building foundations and areas of new hardstanding will prevent recharge of rainfall directly under their footprint, with runoff again being managed appropriately using SuDS. These areas of hardstanding are very limited in size when considered in the context of the large scale of the Order limits, the majority of which will remain permeable.

9.10.81 The change in distribution of groundwater recharge locally is expected to be negligible in terms of its effect on water abstraction and baseflow to rivers. As groundwater is a medium importance receptor this results in a **neutral** effect (**not significant**).

Solar and Energy Storage Park: Flood Risk

Fluvial Flood Risk

9.10.82 The majority of the Solar and Energy Storage Park is in Flood Zone 1 (see **ES Volume 2**: **Figure 9-2 [EN010131/APP/3.2]**) and considered to be at low risk from fluvial flooding (Table 9-11). However, in the northwest and western side of the Solar and Energy Storage Park will potentially involve works in areas of Flood Zone 2 and 3. In impact assessment terms fluvial flood risk therefore varies from low to very high importance across the Solar and Energy Storage Park.

9.10.83 On-site flood risk will be mitigated by raising on the PV panels a minimum of 800mm above ground level (and potentially higher where required), and sequential location of compounds and battery storage facilities. The site will implement mitigation provided in the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) in order to ensure no detriment to off-site flooding. It is, therefore, considered that there would be no change to the current scenarios, thereby resulting in a **neutral** effect (**not significant**).

Surface Water (Pluvial) Flood Risk

9.10.84 The Solar and Energy Storage Park is in general at a very low risk of surface water flooding, although in some areas (mainly associated with watercourses and localised shallow patches) there are areas of low, medium and high risk as outlined in the baseline and shown in **ES Volume 2: Figure 9-2 [EN010131/APP/3.2]**. In impact assessment terms surface water flood risk therefore varies from low to very high importance across the Solar and Energy Storage Park.

9.10.85 On-site flood risk will be mitigated by raising on the PV panels a minimum of 800mm above ground level (and potentially higher where required), and sequential location of compounds and battery storage facilities. The Solar and Energy Park will implement mitigation provided in the Outline Drainage Strategy (**ES Volume 3: Appendix 9-C [EN010131/APP/3.3]**) in order to ensure no detriment to off-site flooding. It is, therefore, considered that there would be no change to the current scenarios, resulting in a **neutral** effect (**not significant**).

Groundwater Flood Risk

9.10.86 The Solar and Energy Storage Park is considered to be at a very low to low risk of flooding from groundwater sources (and therefore of low importance in impact assessment terms). It is considered that groundwater flood risk is unlikely to increase from the Solar and Energy Storage Park as the majority of the infrastructure will be above the ground surface. Infiltration into the soil and underlying geology will remain in line with the antecedent conditions with attenuation provided to manage runoff with storage sized to the 1% AEP (1 in 100 year) design storm plus 40% climate change. As such, there is a **neutral** effect (**not significant**) from flood risk from groundwater.

Sewer Flood Risk

9.10.87 It is not envisaged the flood risk from drainage infrastructure (e.g. sewers) will increase from the existing situation during the operation of the Scheme. Treatment of foul water for the 14 FTE operatives on site will be via self-contained independent non-mains domestic storage and / or a treatment system, or otherwise a septic tank, periodically emptied with the contents disposed of offsite by a registered recycling and waste management contractor. No new connections to foul water infrastructure would be required. The low flood risk related to sewers translates to low importance in impact assessment terms, with no change resulting in a **neutral** effect (**not significant**).

Artificial Sources

9.10.88 There is not envisaged to be any impact on flood risk from artificial sources either on or off-site during operation (i.e., no change), and so no effect to on-or off-site receptors (e.g. ecological or heritage receptors). The low flood risk related to artificial sources translates to low importance in impact assessment terms, resulting in a **neutral** effect (**not significant**).

Grid Connection Corridor: Flood Risk

9.10.89 No part of the Grid Connection Corridor is above ground; therefore, it is considered there would be a no change to future baseline conditions once the cable is installed and the land reinstated. As such, there would be **neutral** effect in terms of flood risk on and off site from all sources (**not significant**).

Decommissioning (assumed to be 2087 to 2088-89)

9.10.90 Potential impacts from the decommissioning of the Solar and Energy Storage Park are similar in nature to those during construction, as some ground works would be required to remove infrastructure installed. A detailed Decommissioning Environmental Management Plan (secured through the DCO) will be prepared prior to decommissioning to identify required measures to prevent pollution and flooding during this phase of the development. A **Framework DEMP** accompanies the DCO Application **[EN010131/APP/7.5].**

9.10.91 As a result, it is considered the decommissioning impacts and effects would mirror those of the construction phase where no significant effects have been identified.

Summary of Effects

9.10.92 There are no residual significant effects on the water environment expected following the implementation of mitigation.

9.10.93 Non-significant effects are listed in **ES Volume 3: Appendix 9-E [EN010131/APP/3.3].**

9.10.94 As there are no significant effects following the implementation of the embedded mitigation measures. On this basis, no additional mitigation measures are identified.

9.11 Enhancement Measures

9.11.1 No enhancement measures are proposed during construction, operation or decommissioning following the incorporation of the embedded measures described above

9.12 Residual Effects and Conclusions

9.12.1 This section summarises the residual significant effects of the Scheme on surface water, groundwater and flood risk following the implementation of embedded mitigation as outlined in Section 9.9, including best practice measures secured via the **Framework CEMP [EN010131/APP/7.3]**. As no significant effects have been identified, no additional mitigation has been outlined.

9.12.2 Effects for decommissioning are considered to be the same as those identified for construction.

9.12.3 There are considered to be no significant residual effects for surface water, groundwater or flood risk during the construction, operation and decommissioning phases of the Scheme.

9.13 Cumulative Effects

9.13.1 The potential for inter-project cumulative effects has been considered for the developments outlined in **Chapter 16: Cumulative Effects and Interactions [EN010131/APP/3.1]**.

9.13.2 Of those developments listed in **ES Volume 3: Appendix 16-A [EN010131/APP/3.3]**, the following developments are considered to have potential for cumulative effects, due to being located in the study area or adjacent to water receptors which are potentially impacted by the Scheme (notably the River Trent). Further details for each of the developments are given in **ES Volume 3: Appendix 16-A [EN010131/APP/3.3]**:

- Scheme ID 6 – Demolition of Cottam Power Station (Planning Ref. 19/00167/SCR). This development would be in close proximity to Seymour Drain and its tributaries, which are affected by the Grid Connection Corridor for the Scheme.
- Scheme ID 9 – West Burton Solar Project (Planning Ref. EN010132) - Proposal for a solar PV farm across four areas of land connected by underground cable. Will generate around 480MW of renewable energy and have the facility to store 20MW of energy. Energy will be transferred to the grid connection point at West Burton Power Station. This development is in the catchment of the River Trent and may require crossings of some of the same watercourses as the Scheme for the grid connection.
- Scheme ID 10 – Cottam Solar Project (Planning Ref. EN010133) - Proposal for a solar PV farm across three areas of land connected by underground cable. Will generate around 600MW of renewable energy and have capacity for energy storage. Energy will be transferred to the grid at Cottam Power Station. This development is in close proximity to the River Till and tributaries, and may require crossings of many of the same watercourses as the Scheme for the grid connection, including the River Trent.
- Scheme ID 11 – Redevelopment of Cottam Power Station. Not currently allocated for any alternative uses but is identified as a Priority Regeneration Area and a broad location for future mixed use regeneration. This development would be in close proximity to Seymour Drain and its tributaries, which are affected by the Grid Connection Corridor for the Scheme.
- Scheme ID 12 – Stow Park Road Residential Development (Planning Ref. 141141). The proposal is the erection of up to 39 dwellings with associated parking and landscaping considering matters of access, appearance, landscaping, layout and scale only. The site is an existing 5.2ha (approx.)

agricultural field to the eastern side of the village of Marton. This development would be in close proximity to Marton Drain and its tributaries, which are affected by the Grid Connection Corridor for the Scheme.

- Scheme ID 13 – Willingham Road Residential Development (Planning Ref. 139840). The proposal is the erection of up to 60 dwellings, considering appearance, landscaping, layout and scale. The site is located south of Willingham Road (B1241), Lea. This development would be in the catchment of the River Trent.

Cumulative Effects during Construction

9.13.3 There is potential for overlap between construction of adjacent developments and construction of this Scheme. Thus, there is the potential for short term, temporary construction related pollutants generated from both the Scheme and adjacent developments to impact on watercourses in the study area. However, provided that standard and good practice mitigation is implemented on the construction sites through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this Scheme, the cumulative risk can be effectively managed and there would not be a significant increase in the risks to any waterbodies. As such, there would not be any significant cumulative effects anticipated during construction on the basis of the above assessment. Potential construction phase cumulative effects, mitigation and significance are summarised in Table 9-14.

Table 9-14: Summary of Cumulative Effect assessment during construction (2025-2028)

Development	Potential Cumulative Impact	Mitigation	Potential Residual Effect (taking mitigation into account)	Significant effect (Yes/ No)
Demolition of Cottam Power Station (Planning Ref. 19/00167/SCR)	Potential pollution of Seymour Drain Catchment WFD waterbody and tributaries (and the downstream Trent from Carlton-on-Trent to Laughton Drain WFD waterbody) from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Unknown whether construction would be simultaneous with the Scheme.	Best practice construction measures assumed to be adopted through the use of a DEMP (or similar), with appropriate adherence to planning and permit conditions.	Neutral	No
West Burton Solar Project (Planning Ref. EN010132)	Potential pollution of the Marton Drain Catchment WFD waterbody, Trent from Carlton-on-Trent to Laughton Drain WFD waterbody and tributaries	Best practice construction measures assumed to be adopted through the use of a CEMP as per the Scheme, with	Neutral	No

Development	Potential Cumulative Impact	Mitigation	Potential Residual Effect (taking mitigation into account)	Significant effect (Yes/ No)
	(including potential to cross some of the same watercourses as required by the Scheme for the Grid Connection Corridor) from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Construction is intended to start in 2024 and so there could be overlap with this Scheme.	appropriate adherence to planning and permit conditions. PEI Report for West Burton Solar Scheme indicates no significant adverse effects relating to hydrology, flood risk and drainage.		
Cottam Solar Project (Planning Ref. EN010133)	Potential pollution of the River Till WFD waterbody and Trent from Carlton-on-Trent to Laughton Drain WFD waterbody and tributaries (including potential to cross the same watercourses as required by the Scheme for the Grid Connection Corridor) from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Construction is intended to start in 2024 and so there could be overlap with this Scheme.	Best practice construction measures assumed to be adopted through the use of a CEMP as per the Scheme, with appropriate adherence to planning and permit conditions. PEI Report for Cottam Solar Scheme indicates no significant adverse effects relating to hydrology, flood risk and drainage.	Neutral	No
Redevelopment of Cottam Power Station	Potential pollution of Seymour Drain Catchment WFD waterbody and tributaries (and the downstream Trent from Carlton-on-Trent to Laughton Drain WFD waterbody) from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Unknown at this stage whether construction would be simultaneous with the Scheme.	Best practice construction measures assumed to be adopted through the use of a CEMP as per the Scheme, with appropriate adherence to planning and permit conditions.	Neutral	No

Development	Potential Cumulative Impact	Mitigation	Potential Residual Effect (taking mitigation into account)	Significant effect (Yes/ No)
Stow Park Road Residential Development (Planning Ref. 141141)	Potential pollution of the Marton Drain Catchment WFD waterbody and the downstream Trent from Carlton-on-Trent to Laughton Drain WFD waterbody and their tributaries from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Construction is understood to have begun and so construction periods would not be expected to overlap.	Best practice construction measures assumed to be adopted through the use of a CEMP as per the Scheme, with appropriate adherence to planning and permit conditions.	Neutral	No
Willingham Road Residential Development (Planning Ref. 139840)	Potential pollution of the Trent from Carlton-on-Trent to Laughton Drain WFD waterbody and its tributaries from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Planning has been granted but the extent of the construction period is not known and so there is some potential for overlap.	Best practice construction measures assumed to be adopted through the use of a CEMP as per the Scheme, with appropriate adherence to planning and permit conditions.	Neutral	No

Cumulative Effects during Operation

9.13.4 Drainage strategies for all cumulative developments listed above have been, or will be, produced with reference to the relevant policies and guidance documents outlined in Section 9.3. This has been confirmed through reviewing development submissions on the relevant planning portals where these are available at this time. In some cases, planning applications have yet to be submitted, but it is assumed in these cases that flood risk assessments and appropriate drainage strategies are to be developed in line with best practice. The Scheme assessed in this chapter will similarly be designed to ensure no long-term deterioration in water quality or increase in flooding. Attenuation and treatment will be provided for runoff from the Scheme prior to discharge to waterbodies or ground. As such, provided that all the mitigation measures are implemented for all schemes, then the cumulative impacts from the Scheme and any cumulative schemes are not anticipated to produce any significant effects. Potential operational phase cumulative effects, mitigation and significance are summarised in Table 9-15.

Table 9-15: Summary of Cumulative Effect assessment during operation (2028)

Development	Potential Cumulative Impact	Mitigation	Potential Residual Effect (taking mitigation into account)	Significant effect (Yes/ No)
Demolition of Cottam Power Station (Planning Ref. 19/00167/SCR)	Not applicable – this application is for a demolition activity and not a long-term development with an ongoing operational requirement.	n/a	Neutral	No
West Burton Solar Project (Planning Ref. EN010132)	Potential pollution of the WFD designated groundwater body from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment. Potential hydromorphological impacts to surface watercourses from watercourse crossings and road outfalls, if required.	A Drainage Strategy and Flood Risk Assessment will be submitted with the ES for the development, incorporating SuDS to control runoff rate and provide treatment of pollutants. Appropriate design of structures is to be included.	Neutral	No
Cottam Solar Project (Planning Ref. EN010133)	Potential pollution of the WFD designated groundwater body from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment. Potential hydromorphological impacts to surface watercourses from watercourse crossings and road outfalls.	A Drainage Strategy and Flood Risk Assessment will be submitted with the ES for the development, incorporating SuDS to control runoff rate and provide treatment of pollutants. Appropriate design of structures is to be included.	Neutral	No

Development	Potential Cumulative Impact	Mitigation	Potential Residual Effect (taking mitigation into account)	Significant effect (Yes/ No)
Redevelopment of Cottam Power Station	Increased flood risk from increased impervious area in the catchment, although there is no increase in flood risk west of the Trent from this Scheme as there is no ongoing operation besides the use of the buried cable route. Potential hydromorphological impacts to surface watercourses from watercourse crossings and road outfalls.	Although not yet published, a Drainage Strategy and Flood Risk Assessment are expected to be produced for the development incorporating SuDS to control runoff rate and provide treatment of pollutants. Appropriate design of structures including watercourse crossings and outfalls is expected where required.	Neutral	No
Stow Park Road Residential Development (Planning Ref. 141141)	Potential pollution of the WFD designated groundwater body from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment. Potential hydromorphological impacts to surface watercourses (e.g. Marton Drain) from watercourse crossings and road outfalls (tributaries of the River Trent and Marton Drain).	A Drainage Strategy and Flood Risk Assessment was submitted with planning for the development, incorporating SuDS to control runoff rate and provide treatment of pollutants.	Neutral	No
Willingham Road Residential Development (Planning Ref. 139840)	Potential pollution of the WFD designated groundwater body from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment. Potential hydromorphological impacts to surface watercourses from watercourse crossings and road outfalls (tributaries of the River Trent).	A Drainage Strategy and Flood Risk Assessment was submitted with planning for the development, incorporating SuDS to control runoff rate and provide treatment of pollutants.	Neutral	No

Potential Cumulative Effects – Shared Grid Connection Corridor

9.13.5 The Grid Connection Corridor has the potential to be shared with the Cottam and West Burton solar projects as detailed in **ES Volume 1, Chapter 5: EIA Methodology [EN010131/APP/3.1].** To better understand the effects associated with the Grid Connection Corridor for this Scheme, and cumulatively with the Cottam and West Burton solar projects, this chapter assesses the following 2 Scenarios:

- Scenario 1: All three projects' ducts and cables are installed within the same construction programme of 24-36 months. As a worst case, it is assumed all the ducts will be installed at once and launch and reception pits and trenches will be backfilled so the area can then be re-instated. Due to the uncertainty of each project, three lots of separate cable-pulling activities are assumed. The access points, haul routes and compounds will remain in place for a maximum of 24-36 months to enable future cable pull.
- Scenario 2: The sequential installation of all three projects' ducts and cables over a maximum 6-year period. As a worse case, all projects assume the construction, and subsequent removal of the haul road, and compounds.

9.13.6 The start and end points for the construction methods (open trench and HDD) will not be confirmed until detailed design. The approach to the EIA is to 1) commit to 'Avoidance Areas' where the method will utilise HDD and 2) assess a 'worst' case scenario that considers both methods. The Avoidance Areas are provided in **ES Volume 2, Appendix 2-B: Figure 1 [EN010131/APP/3.2].** In both scenarios three individual sets of ducts and cables, each requiring a maximum construction working width of between 25 m and 30 m, will be installed within a 100 m corridor. Given, that each project will require its own working corridor with associated trench, it is assumed that regardless of which scenario is taken forward, that effect on flood risk and water quality would be temporary. As each project's ducts and cable run will be separate, then reinstatement post construction should result in a neutral cumulative effect.

9.13.7 Scenario 2 is likely to result in the potential for prolonged effects due to the greater period of time (up to five years). However, provided that standard and good practice mitigation is implemented on the construction sites through their respective CEMPs, appropriate watercourse enhancement provided to mitigate the use of culverts, and conditions of the relevant planning permission, environmental permits and licences enacted, as is being proposed for this Scheme, the cumulative risk can be effectively managed and there would not be a significant increase in the risks to any waterbodies.

9.13.8 During operation, there is no potential for cumulative effects, given there is no anticipated requirement for any works to the watercourses associated with the buried cabling.

9.13.9 During decommissioning, cumulative effects would be similar or less than those associated with construction (as discussed above).

Potential Shared Mitigation

9.12.3 For both Scenario 1 and Scenario 2 above, there is potential have joint construction planning, joint consultation/application with the Environment Agency and Trent Valley Internal Drainage Board for Flood Risk Activity Permits and Land Drainage Consent respectively. This approach would provide efficiencies and reduce the potential replication of effort by all parties. Where there is a requirement for shared use of culverted crossings of watercourses (e.g. for the access track), there is a need for a shared DCO commitment for full reinstatement of watercourses after the maximum 5 years culvert installation, and a commitment to length for length watercourse enhancement to mitigate for the use of culverts.

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