EAST YORKSHIRE SOLAR FARM

East Yorkshire Solar Farm

EN010143

Environmental Statement

Volume 1, Chapter 9: Flood Risk, Drainage and Water Environment
Document Reference: EN010143/APP/.1

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

November 2023
Revision Number: 00

2009

BOOM-POWER.CO.UK

BOOM POWER

Prepared for:

East Yorkshire Solar Farm Limited

Prepared by:

AECOM Limited

Table of Contents

Plates

Tables

9. Flood Risk, Drainage and Water Environment

9.1 Introduction

9.1.1 This chapter of the Environmental Statement (ES) presents the assessment of the likely significant effects of East Yorkshire Solar Farm (hereafter referred to as '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, however potential impacts on ground condition are discussed in section 16.4 of **Chapter 16: Other Environmental Topics, ES Volume 1 [EN010143/APP/6.1]**.

9.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects of the Scheme on Flood Risk, Drainage and Water Environment during the construction, operation, and decommissioning phases.

9.1.3 Chapter 9 should be read in conjunction with the Scheme description provided in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**. Additionally, impacts on the water environment interface with other topics and, as such, should be considered alongside **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]**, where appropriate; and **Appendix 8-2, ES Volume 2 [EN010143/APP/6.2]**, which include details of aquatic ecology surveys and assessments.

9.1.4 This chapter is supported by the following appendices in **ES Volume 2 [EN010143/APP/6.2]**:

a. **Appendix 9-1**: Legislation, Policy and Guidance (Flood Risk, Drainage and Water Environment);

b. **Appendix 9-2**: Water Framework Directive (WFD) Assessment;

c. **Appendix 9-3:** Flood Risk Assessment (FRA); and

d. **Appendix 9-4:** Framework Surface Water Drainage Strategy.

9.1.5 This chapter is also supported by the following figures in **ES Volume 3 [EN010143/APP/6.3]:**

a. **Figure 9-1:** Surface Water Features and Their Attributes;

b. **Figure 9-2:** Drain Names and Internal Drainage Board areas;

c. **Figure 9-3:** Groundwater Features and their attributes;

d. **Figure 9-4:** Fluvial Flood Risk; and

e. **Figure 9-5:** Surface Water Flood Risk.

9.1.6 A glossary and list of abbreviations used throughout this chapter and the ES are defined in **Chapter 0: Table of Contents, Glossary and Abbreviations, ES Volume 1 [EN010131/APP/3.1].**

9.1.7 A Non-Technical Summary of the ES, including the impacts assessed in this chapter, is presented in **ES Volume 4 [EN010143/APP/6.4]** and **ES Volume 1 [EN010143/APP/6.1] comprises this report.**

9.2 Legislation, Policy and Guidance

9.2.1 **Appendix 9-1, ES Volume 2 [EN010143/APP/6.2]** identifies the legislation, policy, and guidance of relevance to the assessment of significant effects of the Scheme on the water environment.

Legislation

9.2.2 Legislation considered by this assessment includes:

a. Environment Act 2021 (Ref. 9-1);

b. Water Act 2014 (as amended) (Ref. 9-2);

c. Flood and Water Management Act 2010 (as amended) (Ref. 9-3);

d. Environmental Protection Act 1990 (as amended) (Ref. 9-4);

e. Land Drainage Act 1991 (as amended) (Ref. 9-5);

f. Water Resources Act 1991 (as amended) (Ref. 9-6);

g. Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref. 9-7);

h. Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended) (Ref. 9-8);

i. The Environmental Damage (Prevention and Remediation) (England Amendment) Regulations 2017 (as amended) (Ref. 9-9);

j. Environmental Permitting (England and Wales) Regulations 2016 (as amended) (Ref. 9-10);

k. Eels (England and Wales) Regulation 2009 (as amended) (Ref. 9-11);

l. Control of Pollution (Oil Storage) (England) Regulations 2001 (as amended) (Ref. 9-12).

m. The Control of Substances Hazardous to Health Regulations 2002 (as amended) (Ref. 9-13);

n. The Anti-Pollution Works Regulations 1999 (Ref. 9-14); and

o. The Water Framework Directive (Standards and Classification) Directions 2015 (as amended) (Ref. 9-15) and

p. The Levelling-up and Regeneration Act 2023 (Ref. 9-16).

National Policy and Guidance

9.2.3 National planning policy and guidance considered includes:

a. Overarching National Policy Statement for Energy (EN-1) (2011) (Ref. 9-17);

b. National Policy Statement for Renewable Energy Infrastructure (EN-3) (2011) (Ref. 9-18);

c. National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011) (Ref. 9-19);

d. Overarching National Policy Statement for Energy (EN-1) (Draft) (2023) (Ref. 9-20)

e. National Policy Statement for Renewable Energy (EN-3) (Draft) (2023) (Ref. 9-21);

f. National Policy Statement for Electricity Networks Infrastructure (EN-5) (Draft) (2023) (Ref. 9-22)

g. National Planning Policy Framework (NPPF) (2023) (Ref. 9-23);

h. National Planning Practice Guidance (NPPG) (2023) (Ref. 9-24);

i. National Planning Practice Guidance: Flood Risk and Coastal Change (2022) (Ref. 9-25);

j. The United Kingdom (UK) Government's Environmental Improvement Plan 2023 (Ref. 9-26);

k. The United Kingdom (UK) Government's 25 Year Environment Plan (Ref. 9-27);

l. The UK Government's Future Water Strategy (2011) (Ref. 9-28);

m. The UK Government's Plan for Water: our integrated plan for delivering clean and plentiful water (2023) (Ref. 9-29);

n. Non-statutory technical standards for Sustainable Drainage Systems (Ref. 9-30);

o. Construction Industry Research and Information Association (CIRIA) Report C753 The SuDS Manual 2nd Edition (2016) (Ref. 9-31).

p. National Highways (2020) Design Manual for Roads and Bridges (DMRB) CD532 Vegetated Drainage Systems for Highways Runoff (Ref. 9-32);

q. The Building Regulations. Approved Document Part H: Drainage and Waste Disposal (2010) (Ref. 9-33); and

r. Water UK Sewerage Sector Guidance (2019) (Ref. 9-34).

Local Policy and Guidance

9.2.4 Local planning policy and guidance considered includes:

a. East Riding Local Plan 2019–2029 Strategy Document (2016) (Ref. 9-35);

b. East Riding Local Plan Update 2020 - 2039 Proposed Submission Strategy Document Update (2022) (Ref. 9-36);

c. Selby District Local Plan (2005) (Ref. 9-37);

d. Selby District Core Strategy Local Plan (2013) (Ref. 9-38);

e. Selby District Council Local Plan Publication Version Consultation (2022) (Ref. 9-39);

f. East Riding of Yorkshire – Sustainable Drainage Systems (SuDS) & Surface Water Drainage Requirements For New Development Supplementary Planning Document (SPD) 2016 (Ref. 9-40); and

g. North Yorkshire County Council (2019) SuDS Design Guidance (Ref. 9-41).

9.3 Consultation

Scoping Opinion

9.3.1 A scoping exercise was undertaken in September 2022 to establish the content of the assessment and the approach and methods to be followed.

9.3.2 The Scoping Report (**Appendix 1-1, ES Volume 2 [EN010143/APP/6.2]**) was issued on 9 September 2022 and records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria to be applied in the assessment to identify and evaluate the likely significant effects of the Scheme on Flood Risk, Drainage and Surface Water.

9.3.3 The Scoping Opinion was received on 20 October 2022 (**Appendix 1- 2, ES Volume 2 [EN010143/APP/6.2]**). The feedback received from stakeholders at scoping and Applicant responses in relation to Flood Risk, Drainage and Surface Water are presented in **Appendix 1-3, ES Volume 2 [EN010143/APP/6.2]**. This is also summarised in **Table 9-1** below.

9.3.4 Further consultation in response to formal pre-application engagement was undertaken through the Preliminary Environmental Information Report (PEI Report), issued in May 2023. Responses to this statutory consultation are presented in the **Consultation Report [EN010143/APP/5.1]. Table 9 2** outlines the statutory consultation responses relating to Flood Risk, Drainage and Surface Water and how these have been addressed through the ES.

9.3.5 Further detail on consultation can also be found in **ES Chapter 4: Consultation, ES Volume 1 [EN010143/APP/6.1].**

Table 9-1. Scoping opinion responses (Flood Risk, Drainage and Surface Water)

Consultee	Summary of comment	How matter has been addressed	Location of response
Planning Inspectorate	Nutrient neutrality assessment (ID 3.4.1): The Applicant proposes to scope out a nutrient neutrality assessment. Paragraph 9.5.41 states that although the site is located within a Local Planning Authority (LPA) area affected by nutrient pollution impacting on some designated sites, the nutrient pollution issues relate only to the Hornsea Mere Special Protection Area (SPA) which is not hydrologically connected to the Proposed Development site. It is stated (in paragraph 9.5.42) that the Proposed Development would result in the removal of pesticide and fertiliser use on the land and so would result in a reduced runoff of nutrients into surrounding watercourses. Furthermore, construction welfare facilities would not discharge into the mains network and would be temporary, and permanent welfare facilities would be small scale. Paragraph 9.8.11 states that it is not yet confirmed how any generated wastewater will be managed.	Noted that the Inspectorate agrees that the Scheme does not need to demonstrate nutrient neutrality through a nutrient neutrality assessment. The ES considers within this chapter the potential for LSE to occur in relation to nutrient and / or other pollution on water features. The ES include a description of the measures proposed to reduce pollutant runoff to nearby watercourses, both during construction, secured within the **Framework CEMP [EN010143/APP/7.7]**, and operation, secured within the **Framework Surface Water Drainage Strategy (SWDS) Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**.	An assessment of effects on the water environment is undertaken within Section 9.7 of this chapter. Also refer to the **Framework CEMP [EN010143/APP/7.7])** and **Framework SWDS Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**

Consultee	Summary of comment	How matter has been addressed	Location of response
	The Inspectorate is content that the Proposed Development does not need to demonstrate nutrient neutrality through a nutrient neutrality assessment. However, where there is the potential for Likely Significant Effect (LSE) to occur in relation to nutrient and/or other pollution on water bodies, this should be assessed within the ES. The ES should also include a description of any measures proposed to reduce pollutant runoff into nearby watercourses, e.g. design measures or best practice measures to be secured via the Construction and Environmental Management Plan (CEMP).		
Planning Inspectorate	Study area (ID 3.4.2): The Scoping Report states that a Study Area of "approximately 1 km" from the site boundary is used to identify water bodies that could be affected by the Proposed Development and "approximately 2 km" for the baseline assessment. It is unclear why these Study Areas are approximate, although it is noted that paragraph 9.4.2 states that the Study Area varies depending on the characteristics of	Typically, a distance around the site boundary of 1 km is used to identify potentially sensitive receptors. This chapter of the ES has used professional judgement to consider the potential extent of impact of the development and include other potentially sensitive receptors beyond the Study Area if identified as appropriate.	The Study Area is defined in Section 9.4 of this chapter and is shown in **Figure 9.1 Surface Water Features and their Attributes** (**ES Volume 3 [EN010143/APP/6.3])**.

Consultee	Summary of comment	How matter has been addressed	Location of response
	species or habitat potentially impacted. The ES should explain how the Study Area was selected, ensuring that the area relates to the extent of LSE rather than an arbitrary or approximate Study Area boundary.	Therefore 'approximate' was stated within the Scoping Report to ensure there is no arbitrary rigid limit to the extent of the assessment. The Study Area is defined in Section 9.4 of this chapter and is shown in **Figure 9.1 Surface Water Features and their Attributes (ES Volume 3 [EN010143/APP/6.3])**. Watercourses across the Study Area generally drain towards the River Foulness, River Derwent and River Ouse, and so these are considered the final receiving waterbodies that could conceivably be affected.	
Planning Inspectorate	Designated sites (ID 3.4.3): The Scoping Report identifies sites in the study area or downstream of the site that are designated for aquatic ecology. Table 8-1 of the [Scoping] Ecology chapter lists additional designated sites which appear to have hydrological components, e.g. Lower Derwent Valley Special Area of Conservation (SAC), Ramsar site, SPA and Local Nature Reserve (LNR); Breighton Meadows Site of Special Scientific Interest (SSSI); and Derwent	The assessment considers all water dependent designated sites that could be affected by the Scheme. It considers whether the Scheme affects surface water and groundwater flows to these features, their water quality, and any changes to flooding characteristics on the site. The Lower Derwent Valley designated sites (SAC, Ramsar site, SPA and LNR), Breighton Meadows SSSI and Derwent Ings SSSI are all considered within this assessment.	Details of the Study Area are provided in section 9.5 of this chapter and assessment of the Scheme's impact on all identified water receptors (including water dependent designated sites) undertaken in section 9.7. These sites are shown in **Figure 9.1 Surface Water Features and their Attributes** (**ES Volume 3 [EN010143/APP/6.3])**.

Consultee	Summary of comment	How matter has been addressed	Location of response
	Ings SSSI. It is unclear why these designated sites are not included. The assessment should consider all designated sites that could be affected by the Proposed Development, and evidence agreement with relevant statutory consultees regarding the scope of sites considered, where possible.	Sites considered by the assessment were presented to the Environment Agency, North Yorkshire Council, East Riding of Yorkshire Council, Ouse and Humber Drainage Board, Ouse and Derwent Internal Drainage Board and Selby Area Internal Drainage Board at a meeting on 15th March 2023 prior to Statutory Consultation.	
Planning Inspectorate	Water quality sampling (ID 3.4.4): The Scoping Report states that no water quality sampling is proposed beyond a site walkover survey, but no justification is provided for this approach. The ES should describe the existing quality of water affected by the Proposed Development. Given that there are waterbodies within the site boundary, the Proposed Development site is located within multiple Water Framework Directive catchments, and construction impacts may alter water quality, surface water quality surveys should be undertaken to inform the baseline and reported in the ES.	It is considered that the nature of the Scheme, having a relatively light footprint and limited ground works does not warrant a water quality monitoring programme at this stage. The nature of water bodies within the Site are generally minor comprising small ponds and ditches. Water quality of the more significant watercourses within the Order limits and beyond has been determined with reference to background water quality data from routine Environment Agency monitoring. Background water quality data is available for a number of locations on the Environment Agency Water Quality Archive website. This includes water quality data for River Ouse at Long	Background water quality data is presented in section 9.5 of this chapter. The requirement for pre-construction water quality monitoring is secured in the **Framework CEMP [EN010143/APP/7.7]**.

Consultee	Summary of comment	How matter has been addressed	Location of response
		Drax, and River Derwent at Loftsome Bridge and Fleet Dike at Wressle Clough. These data are presented in section 9.5 of this chapter. Importance of water bodies has been 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 (i.e. regardless of the existing water quality there should be no additional pollution as a result of the Scheme). Water quality impacts have been determined based on a risk assessment that does not require input of raw background water quality data. Water quality monitoring is also only effective when there is a clear purpose for it and may require monitoring over a long period of time to ensure reliable and robust results. This approach has been discussed with the Environment Agency at an engagement meeting on 15 March 2023 and in subsequent discussion, see ‘Additional Engagement’ below. As per these discussions it is confirmed that pre-construction water quality monitoring would be undertaken prior to	

Consultee	Summary of comment	How matter has been addressed	Location of response
		commencing works, as secured in the **Framework CEMP [EN010143/APP/6.7]).**	
Planning Inspectorate	Embedded mitigation (Ref 3.4.5): The Scoping Report states that "it is assumed that the protection of water environment receptors would be taken into account within the iterative design process". Where mitigation measures are relied upon to prevent a significant effect from occurring, these should be detailed within the ES, along with the proposed method by which these are to be secured within the DCO.	As an iterative process, the design presented in **Chapter 2**: **The Scheme** and illustrated in **Figure 2-3 of this ES** has been developed to mitigate against significant effects occurring. The embedded mitigation measures are detailed within section 9.6 of this chapter of the ES and the assessment of impacts on water environment receptors takes into account these measures.	Mitigation measures relevant to flood risk, drainage and the water environment are outlined in section 9.6 of this chapter.
Planning Inspectorate	Ponds (Ref 3.4.6): Individual ponds are not considered within the Flood Risk, Drainage and Surface Water chapter of the Scoping Report on the basis that they will be assessed within the Ecology chapter of the ES. However, there is no mention of ponds within the Ecology chapter of the Scoping Report and so it is unclear whether they are assessed as sensitive receptors or not. The Inspectorate is of the opinion that any LSE on individual ponds should be	Individual ponds are considered within this chapter of the ES on the basis of whether construction and site infrastructure may affect water levels and quality, and an Importance is assigned to these features (see section 9.5). Refer to **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]** and **Appendix 8-2**, **ES Volume 2[EN010143/APP/6.2]** for consideration of ecological impacts to ponds.	For assessment of impacts of the Scheme to water environment receptors refer to Section 9.7 of this chapter of the ES. Refer to **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]** and **Appendix 8-2**, **ES Volume 2[EN010143/APP/6.2]** for consideration of ecological impacts to ponds. An FRA is included as **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**.

Consultee	Summary of comment	How matter has been addressed	Location of response
	assessed within the ES. Where there is the potential for impacts in terms of flood risk and volume this should be addressed within the Flood Risk, Drainage and Surface Water aspect chapter. Where there is the potential for effects on ecological features this should be addressed within the Ecology aspect chapter. Cross-reference should be made between the two chapters as appropriate.	A Flood Risk Assessment (FRA) is included as **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**.	
Environment Agency	The Scoping Report stated that direct impacts on the River Derwent SSSI and SAC from the grid connection cable will be avoided by the use of trenchless crossing techniques. Paragraph 2.3.43 confirms that these trenchless techniques may also be used for river crossings, and in paragraph 8.8.3 it is stated that main rivers will be crossed using these techniques. We are supportive of this approach. The use of trenchless techniques for crossing major watercourses is in line with best practice, but we recognise that potential for modifications to smaller watercourses in particular has been flagged. Use of techniques which	Trenchless crossings are confirmed for the River Ouse (HDD 6), River Derwent (HDD 3), Featherbed Drain (HDD 1) and an unnamed drain west of (and draining to) the River Derwent (coded DE53) (HDD 5). Additionally, an HDD crossing beneath the A63 to the west of Hagthorpe Hall (HDD 4) will avoid an intrusive crossing of an Ouse and Derwent Internal Drainage Board (IDB) ditch (Loftsome Bridge Drain). The indicative locations of HDDs are shown on **Figure 9-2 and Figure 2-4, ES Volume 3 [EN010143/APP/6.3]**. Crossing requirements, installation techniques and mitigation for all affected watercourses are outlined in this chapter. Embedded mitigation is	Embedded mitigation is described in section 9.6 of this ES chapter and an impact assessment provided in section 9.7 where relevant. An assessment against WFD requirements (including ensuring no deterioration or prevention of future improvement in WFD elements of waterbodies) is provided in **Appendix 9-2 WFD Assessment, ES Volume 2 [EN010143/APP/6.2]**.

Consultee	Summary of comment	How matter has been addressed	Location of response
	avoid the need for any physical modification to watercourses is encouraged, but where modification is unavoidable, we would expect to see details of proposed mitigation measures to avoid or offset detrimental impacts to physical processes and any dependent habitats.	described in section 9.6 and, where there is potential for likely significant effects on water features (including water quality and morphology), an impact assessment is provided in section 9.7. An assessment against WFD requirements (including ensuring no deterioration or prevention of future improvement in WFD elements of waterbodies) is provided in **Appendix 9-2 WFD Assessment, ES Volume 2 [EN010143/APP/6.2]**.	
Environment Agency	Where access tracks cross areas identified to be at risk from flooding, they should be maintained close to existing ground levels to avoid displacing flood risk. If raised, for example to allow safe access and egress in times of flood, consideration of displacement and also conveyance will need to be considered. Compounds should be located outside areas identified to be at flood risk during this phase (i.e. it may use climate change allowances appropriate for its lifetime).	These requirements are noted and have been taken into account in the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework Surface Water Drainage Strategy**, **(Appendix 9-4, ES Volume 2 [EN010143/APP/6.2])**, where practicable. The location of temporary site compounds is provided in **Figure 2-4, ES Volume 3 [EN010143/APP/6.3]**. As most of the Grid Connection Corridor to the south of the Selby to Hull railway is in Flood Zone 3, it has not been possible to avoid the placement of two temporary construction compounds in	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].**

Consultee	Summary of comment	How matter has been addressed	Location of response
		this mapped Flood Zone (Construction Compound Areas D and E). Where compounds need to be located within Flood Zone 2 or 3 appropriate mitigation will be in place. Further information is provided in the **FRA** (**Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**.	
Environment Agency	Climate parameters for the in-combination climate change impact assessment of the Scheme indicates that Sea Level Rise may be scoped out of Chapter 6, which we feel strongly contradicts with Chapter 9. For clarity, we believe the development site is likely to be susceptible to the risks of sea level rise. Flood risk in the area is tidal from some sources, and therefore rising sea levels are likely to increase that risk in the future. To ensure the risk is not underestimated, a Flood Risk Assessment (FRA) should be produced before that risk is considered for scoping out.	The River Ouse is tidal within the Study Area therefore sea level rise is scoped into the assessment. The **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** presents the required sea level climate change allowances for the Study Area and engagement has been undertaken with the Environment Agency with regards to climate change scenarios.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]).**
Environment Agency	The Environment Agency is responsible for the management of groundwater resources in England. Many activities result in physical disturbance of aquifers and	This chapter of the ES considers impacts that could result from the Scheme on groundwater levels and flow, and groundwater quality. A **Framework CEMP [EN010143/APP/7.7]** is included	Refer to section 9.6 of this chapter for Embedded Mitigation that includes protection of groundwater and section 9.7 for the impact assessment. Also refer to the **Framework CEMP**

Consultee	Summary of comment	How matter has been addressed	Location of response
	groundwater resources. Examples include: • construction of cuttings and tunnels • developments that require piling • foundation development These activities can artificially lower or raise groundwater levels, alter groundwater flow paths, or even cut off groundwater flow completely. Some activities (for example, tunnels and open boreholes) can also interconnect aquifers that were previously separate. This can all result in resource and quality problems Piling or construction should not result in a detrimental impact on the water environment. Appropriate risk assessment should be undertaken to ensure any risks are appropriately understood and mitigation measures are emplaced. Mitigation measures can be integrated into a Construction and Environment Management Plan (CEMP).	with the DCO Application outlining measures for protection of the water environment including groundwater.	**[EN010143/APP/7.7]** outlining measures for protection of the water environment including groundwater.
Environment Agency	The presence of source protection zones (SPZs) is confirmed within the Study Area. The Environment Agency	This chapter considers impact on groundwater levels and flow, and groundwater quality where it relates to	The groundwater baseline is provided in section 9.5 of this chapter. Mitigation is outlined in section 9.6 and an

Consultee	Summary of comment	How matter has been addressed	Location of response
	requires the promoters of schemes of national or regional significance to protect groundwater when choosing the location for their activity or development. In the cases where this is not possible due to national or regional interests, the Environment Agency expects to be fully involved in the scheme development to mitigate groundwater risks via the Environmental Permitting Regulations, where applicable. Promoters are expected (via the EIA process) to identify all the potential pollution linkages and apply best available techniques to mitigate the risks. We have the following groundwater position statement (C5) for pipelines and fluid filled cables. The Environment Agency will normally object to pipelines or fluid filled cables that transport pollutants, particularly hazardous substances that: • pass through SPZ1 or SPZ2 where this is avoidable • are below the water table* in principal or secondary aquifers	Scheme drainage. It also considers the presence and potential impacts to SPZs where appropriate. The Grid Connection Corridor does not pass through SPZ 1 or 2, but the southern portion around Drax is in SPZ 3. All other elements of the Scheme (including the Solar PV Site and Interconnecting Cables) are located outside of mapped SPZs. Refer to **Figure 9-3 Groundwater Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]**. The Scheme will not use any fluid filled cables.	assessment of potential impact to the groundwater environment presented in section 9.7.

Consultee	Summary of comment	How matter has been addressed	Location of response
	Where there is an existing or unavoidable need for pipelines or fluid filled cables to pass through SPZ1 or SPZ2, operators are expected to adopt Best Available Techniques and operate in accordance with the Energy Networks Association guidance. Where existing pipelines or fluid filled cables are already below the water table, or if the water level subsequently rises, the Environment Agency will work with operators to mitigate the risks. The Environment Agency will only agree to any redevelopment scheme with sub water table pipelines or fluid filled cables for the transport of hazardous substances where there are substantial mitigating factors. When the opportunity to replace existing fluid filled cables in SPZ1 and SPZ2 arises the Environment Agency will work with the operators to agree the best environmental option. The Environment Agency expects operators to carry out a site-specific risk assessment prior to the decommissioning of pipelines or fluid filled cables in SPZ1 and SPZ2. It will then work with operators to agree the best available environmental option.		

Consultee	Summary of comment	How matter has been addressed	Location of response
Environment Agency	The dewatering activities on-site could have an impact upon local wells, water supplies and/or nearby watercourses and environmental interests. This activity was previously exempt from requiring an abstraction licence. Since 1 January 2018, most cases of new planned dewatering operations above 20 cubic metres a day will require a water abstraction licence from us prior to the commencement of dewatering activities at the site. Materials and chemicals likely to cause pollution should be stored in appropriate containers and adhere to guidance for the storage of drums and intermediate bulk containers. We advise that polluting materials and chemicals are stored in an area with sealed drainage.	This chapter considers impact on groundwater levels and flow, and groundwater quality where it relates to Scheme drainage (see section 9.7). It also considers the presence and potential impacts to groundwater abstractions and private water supplies (PWS) where appropriate (see section 9.7). Further information on storage of materials is provided in section 9.6 along with detail of permits and consents. This includes Full or Temporary water abstraction licence(s) under section 24 of the Water Resources Act 1991.	Refer to section 9.6 of this chapter for embedded mitigation and permits and consents, section 9.7 for the impact assessment, including consideration of potential to impact on abstractions and PWS.
Environment Agency	The Environment Agency questions the assumption that power cables will be left in situ beneath watercourses following decommissioning and would encourage the inclusion of commentary on the potential legacy impacts this could present for both natural geomorphic evolution and	These comments are noted, and the assessment of impacts includes decommissioning and potential to affect natural geomorphic evolution and potential future restoration of affected areas (see section 9.7 of this chapter).	Refer to section 9.7 of this chapter and the **Framework DEMP [EN/010143/APP/7.9]**.

Consultee	Summary of comment	How matter has been addressed	Location of response
	potential future restoration of affected areas. The Environment Agency note the applicant's intention to submit a Framework Decommissioning Environmental Management Plan (DEMP) alongside the ES. The Framework DEMP should include the development components in section 2.6, including any remaining development that could affect flood risk infrastructure (even if left in situ these may have an adverse impact on flood risk).	Also refer to the **Framework DEMP [EN/010143/APP/7.9].**	
Environment Agency	We note and welcome the intention for an FRA to be produced as a technical addendum to the ES. The FRA should be in accordance with the NPPF, Planning Practice Guidance and also the relevant National Policy Statement (NPS). This is likely to have a bearing on the climate change allowances to be used, and also whether additional modelling will be required. The FRA will need to: • Evidence and demonstrate that risk from all sources, now and in the future is taken into account. This may need to include additional	An **FRA** is included as **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** taking into account these requirements. This provides an assessment of flood risk for the baseline scenario. Engagement with the Environment Agency has been undertaken to inform the FRA (see Additional Engagement below). Modelling undertaken to inform the FRA uses the 2080s Upper End Climate Change allowance which would account for later than the expected decommissioning date (which for the purposes of the ES is considered	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework DEMP [EN010143/APP/7.9]**

Consultee	Summary of comment	How matter has been addressed	Location of response
	modelling, which the report indicates will involve some consultation with the Environment Agency. • Take account of the relevant NPSs, and climate change allowances ("credible maximum"). • Evidence and demonstrate that for any reliance on current or proposed flood risk infrastructure, it is made clear what this dependence is. Contributions may be required or expected depending on the interaction, and we would recommend this is discussed with the relevant Risk Management Authorities. • Evidence and demonstrate that sensitive flood risk infrastructure can be located outside flood risk areas; or within flood risk areas with sufficient mitigation. • Include full justification of the lifetime of the development (Section 2.6.1 indicates 40 years, but it could be longer). The revised Planning Practice Guidance states that non-residential development	approximately 2067). Decommissioning is secured in the **draft DCO [EN010143/APP/3.1]** as this proposes a time limited decommissioning requirement of 40 years post final commissioning. The **Framework DEMP [EN010143/APP/7.9]** presented with this DCO Application will be updated prior to decommissioning.	

Consultee	Summary of comment	How matter has been addressed	Location of response
	should include an assessment of at least 75 years. We highlight the need for full justification for the lifetime, and that this may have a bearing on the evidence required and/or need for further modelling. We recommend that a longer lifetime is considered, to ensure that the development would remain safe under a longer lifetime and/or additional climate change impacts. • Decommissioning risks at the appropriate time are understood, or that these risks would be explored at the appropriate time in the future.		
Environment Agency	Construction operations will be further detailed in the CEMP. The following activities may have an interaction with flood risk, and should therefore ensure they utilise any information from the FRA: • Storage of materials should be utilised outside flood risk areas; • Temporary watercourse crossings: • We do not believe there are any intended for 'main rivers,' but if they are required then we would ask to	Embedded mitigation identified for the Scheme is outlined in section 9.6 of this chapter, including an outline of mitigation measures and best practice documents that inform the **Framework CEMP [EN010143/APP/7.7]**. Mitigation measures with regard to flooding are also summarised in the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**.	Refer to section 9.6 for embedded mitigation. Further detail is given in the **Framework CEMP [EN010143/APP/7.7]** and **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]).**

Consultee	Summary of comment	How matter has been addressed	Location of response
	see further details. Culverts are unlikely to be acceptable over any 'main river' because of their adverse impacts. • Temporary crossings over ordinary watercourses should consider the PPG position on use of culverts and East Riding of Yorkshire Council's Local Plan Policy ENV 6. However, these fall under the remit of the appropriate Risk Management Authority; the lead local flood authority and/or internal drainage board may also make advice in relation to ordinary watercourses.		
Environment Agency	The Scoping Report indicates that compensatory storage may be required depending on results of the FRA. The need for compensatory storage will need to take into account the effects of climate change (i.e. not just the flood zones), and also the sensitivity of any receptors.	The FRA has considered the need for compensatory storage taking into account sensitivity of receptors where appropriate. The outcome of the FRA has been included within the water environment ES chapter and assessed in EIA terms.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]).**
Canal and River Trust	Works in proximity to the River Ouse have the potential to increase the risk of pollution to the River through the runoff of silt laden deposits or the	The potential impact to watercourses relating to runoff or dust during construction is assessed within section 9.7 of this chapter.	Refer to the **Framework CEMP [EN010143/APP/7.7].**

Consultee	Summary of comment	How matter has been addressed	Location of response
	release of dust. There is a significant risk of contamination through poor sediment management from exposed soils, with specific risks likely associated with drilling works in proximity to the river. The Framework CEMP would be expected to provide adequate information to ensure that the mitigation measures are adequate. We understand that this will be made available at submission of the application, and we would wish to review this and provide further comment at that stage.	A Framework CEMP was provided with the Preliminary Environmental Information Report (PEI Report) for which the Canal and River Trust were a consultee. The Framework CEMP has been further revised and updated for inclusion with the DCO Application (**Framework CEMP [EN010143/APP/7.7]**) and includes comprehensive measures to ensure that any such impacts are mitigated. There will be continued opportunity for the Canal and River Trust to comment on the document through the DCO examination process.	
Canal and River Trust	The submitted documents indicate that new cables will be sited underground. The Trust generally welcomes this approach, as it would help to minimise any impact on the visual appearance of our waterway corridors. It would also minimise any potential harm to navigation that could be caused through the positioning of cables above navigable channels. Should the scheme be amended to incorporate above ground caballing or crossings of the River Ouse, then we advise that the Scoping Report would need to be	It is confirmed that the River Ouse will be crossed using an underground, trenchless approach (HDD). As such, no assessment of impact on navigation has been undertaken as it is not applicable.	Refer to section 9.6 of this chapter for further detail of watercourse crossings, including the River Ouse.

Consultee	Summary of comment	How matter has been addressed	Location of response
	amended to ensure that the visual impacts of the cables would be considered and mitigated for. In addition, consideration would need to be given to the potential impact on Navigation on the River Ouse and headroom available (notably, the Ouse in this location has unrestricted headroom).		
Canal and River Trust	Our consent as Navigation and Harbour Authority may be required for the installation of a new cable below the River Ouse.	The Scheme will cross the River Ouse via HDD and protective provisions for the benefit of the Canal and River Trust are included at Part 4 of Schedule 14 of the **draft DCO [EN010143/APP/3.1**] accompanying the Application. Post-consent, any further approvals of plans will be governed by the terms of the protective provisions.	Refer to section 9.6 for details regarding permits and consents. **Draft DCO [EN010143/APP/3.1**
Selby Area Internal Drainage Board (IDB)	The Selby Area IDB should be consulted for any works affecting watercourses within their district. Also, our current guidelines for any increase in surface water discharge are as follows: • If the surface water were to be disposed of via a soakaway system, the IDB would have no	The requirements of the IDB have been noted and are incorporated into the Scheme design in terms of watercourse buffers. All necessary consents will be applied for at the relevant time from the relevant IDB covering each part of the Scheme (see section 9.6 of this chapter).	Refer to section 9.6 of this chapter for details of embedded mitigation including watercourse buffers, drainage arrangements and requirements for permits and consents (including IDB consent). Refer to **Framework Surface Water Drainage Strategy Appendix 9-4, ES**

Consultee	Summary of comment	How matter has been addressed	Location of response
	objection in principle but would advise that the ground conditions in this area may not be suitable for soakaway drainage. It is therefore essential that percolation tests are undertaken to establish if the ground conditions are suitable for soakaway drainage throughout the year. • If surface water is to be directed to a mains sewer system the IDB would again have no objection in principle, providing that the Water Authority are satisfied that the existing system will accept this additional flow. • If the surface water is to be discharged to any ordinary watercourse within the Drainage District, Consent from the IDB would be required in addition to Planning Permission and would be restricted to 1.4 litres per second per hectare or greenfield runoff • No obstructions within 7 metres of the edge of an ordinary watercourse are permitted without Consent from the IDB. If surface water or works are planned	It is noted that the Solar PV Site is in the administrative area of the Ouse and Humber Drainage Board. The Ouse and Humber IDB agreed the scope of the Framework Surface Water Drainage Strategy (refer to Additional Engagement below).	**Volume 2 [EN010143/APP/6.2]** for further drainage details.

Consultee	Summary of comment	How matter has been addressed	Location of response
	adjacent to a Main River within the Drainage District, then the Environment Agency should be contacted for any relevant Permits Recommendations: • Should Consent be required from the IDB as described above, we would recommend that this is a PLANNING CONDITION of any PLANNING DECISION. Reason: requirements of Land Drainage Act 1991 (as amended) • PLANNING CONDITION: for Larger Development: Should on-site SuDS or flow restriction be proposed as part of any larger development the IDB requests that those restricted flow measures or attenuation are put in place before occupancy and within 3 months of development progressing on site. Reason: not to increase flood risk downstream of sites during temporary works / development. • ANY surface water discharge into ANY watercourses in, on, under or		

Consultee	Summary of comment	How matter has been addressed	Location of response
	near the site require CONSENT from the Drainage Board.		
Ouse and Humber Drainage Board	The Board has NO OBJECTION to the above consultation at this stage, and requests that it is consulted throughout the planning process to ensure a satisfactory drainage design is developed. The Board would like to draw attention to its Advice for Developers Document and Land Drainage Byelaws. In relation to this proposed development, the Board would like to highlight the requirement for a 9-metre gap to be left adjacent to all watercourses.	The advice and byelaws of the IDB have been noted and are incorporated into the Scheme design in terms of watercourse buffers, which have been set as a minimum of 10 m from solar PV infrastructure and 30 m in the case of the River Ouse, River Derwent and unnamed drain (DE53). The scope of the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** was agreed with the Ouse and Humber Drainage Board. Protective provisions for the benefit of drainage authorities have been included at Part 3 of Schedule 14 of the draft DCO to afford protection to their interests.	Refer to section 9.6 of this chapter for details of embedded mitigation including watercourse buffers and drainage arrangements. Refer to **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2**] for further drainage details. **Draft DCO [EN010143/APP/3.1**]
Yorkshire Water	Chapter 9 of the Scoping Report states that an FRA will form an appendix to the ES, reviewing the current and future flood risk. This document will help to inform scheme design and set out any mitigation requirements which	Comments were noted. Communications with Yorkshire Water in relation the protection of water and sewerage infrastructure is detailed in section 11.6: Telecommunications,	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2**]**.**

Consultee	Summary of comment	How matter has been addressed	Location of response
	need to be addressed within the Surface Water Drainage Strategy. Yorkshire Water welcome the above and have no further comments to make on the scoping request. However, the developers must contact Yorkshire Water with regard to protecting water and sewerage infrastructure that is laid along the route of the cable and within the Solar Photovoltaic (PV) Site.	Television Reception, and Utilities of ES Chapter 16: Other Environmental Topics. Protective Provisions for the benefit of water undertakers have been included within Part 1 of Schedule 14 of the **Draft DCO [EN010143/APP/3.1]** to afford protection to their interests. Further negotiations regarding these Provisions will be undertaken should consent be granted.	**Chapter 16: Other Environmental Topics, ES Volume 1 [EN010143/APP/6.1**]. **Draft DCO [EN010143/APP/3.1]**

Table 9-2. Statutory consultation responses (Flood Risk, Drainage and Surface Water)

Consultee	Summary of comment	How matter has been addressed	Location of response
Environment Agency	We support that main river crossings are to be completed using trenchless techniques (2.3.8, 2.4.7 & 2.6.61). These works will need to consider any impacts to Environment Agency (EA) assets/defences or land ownership.	Noted. HDD send and receive pits would be a minimum of 16 m from the toe of flood defences. The cable would be installed a minimum of 5 m below bed level of the River Ouse and River Derwent given their scale as set out in the Framework CEMP.	Further details regarding watercourse crossings are provided in section 9.6 of this chapter. Indicative positioning of HDDs provided in **Figure 9-2 and Figure 2-4, ES Volume 3 [EN010143/APP/6.3].** **Framework CEMP [EN01043/APP/7.7].**
Environment Agency	2.4.13 We are supportive of the sequential approach to the layout of the site and avoidance of flood zone 3 for solar PV infrastructure and that flood zone 3 will only be used to	Full details of the Sequential Test undertaken for the Scheme can be found in the **FRA (Appendix 9-3 ES Volume 2**).	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]).**

Consultee	Summary of comment	How matter has been addressed	Location of response
	deliver ecological enhancement, and that minimum heights of equipment are to be determined for the ES to protect against flood risk for any equipment in flood zone.	The Sequential Test is also discussed in **Chapter 3: Alternatives and Design Evolution** of this ES.	**Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1].**
Environment Agency	2.2.5.8 This section details that grid connection stations will be located within flood zone 1 – this will need to be confirmed by modelling, and the modelling will need to undergo detailed review.	Hydraulic modelling has been undertaken to determine flood zone designation and inform the Scheme design. Results are presented in the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**. Additionally, since the PEI Report, the Scheme design has evolved such that both Grid Connection Substations are now located in Solar PV Area 1c (see **Figure 9-3, ES Volume 3 [EN010143/APP/6.3]**). This is discussed in **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1].**	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1].**
Environment Agency	Table 2-1 Field Stations for Flood Risk. This table states that any field stations located in flood zone 2 will be raised above ground level, with the height to be determined by the full FRA carried out for the ES –this will also need to be	Hydraulic modelling has been undertaken to determine flood zone designation and inform the Scheme design. Various Annual Exceedance Probability (AEP) events have been simulated (including the latest climate change allowances) which have informed the Final Flood Level of any field stations	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**

Consultee	Summary of comment	How matter has been addressed	Location of response
	informed by the modelling which is currently under discussion.	that are potentially at risk of flooding. Results are presented in the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**. Field Stations will not be placed in Flood Zone 3. Field Stations located within Flood Zone 2 and in areas of surface water flood risk will be raised a minimum of 300 mm above the modelled design flood event in that location.	
Environment Agency	It is good to see that Sea level rise is scoped in and that Table 6-1 shows that storm surge, tidal risk, flash flooding, including both pluvial and fluvial will be assessed in detail in the full FRA produced for the ES. We are supportive that a longer lifetime has been considered, which includes the parameters detailed in 6.5.35.	Noted. Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** for details of the assessment.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**
Environment Agency	Table 9-1. Scoping opinion where relevant to water environment: Groundwater Protection is stated that the framework CEMP outlines the measures for protection of groundwater, however, at present, these are not included in the framework CEMP (Appendix 2-1, PEI	Outline measures for groundwater protection during construction are given in the Framework CEMP, and this will be developed into a detailed CEMP prior to construction, secured through the DCO. Surface water drainage arrangements are outlined in the **Framework Surface**	Refer to the **Framework CEMP [EN010143/APP/7.7]** and **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2**]. **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1**].

Consultee	Summary of comment	How matter has been addressed	Location of response
	Report Volume 4). We recommend that groundwater protection measures are included in the final CEMP. We welcome the plans to submit a Framework Surface Water Drainage Strategy at the ES stage, and delivery of a detailed Strategy, under the DCO which details the groundwater protection measures to be used. Please refer to the guidance Environment Agency's approach to groundwater protection for guidance in the production of these documents.	**Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** and have been developed in consultation with the Ouse and Humber Drainage Board, with whom it has been agreed that the strategy only need consider Solar PV Area 1c (Grid Connection Substations). Drainage from the Grid Connection Substations will occur via three attenuation storage areas designed for the 1 in 100-year storm event (40%AEP). A detailed strategy will be provided post-consent following the detailed design of the grid connection substations and informed by infiltration testing, as secured through the DCO. Chapter 2 of this ES describes how foul water will be collected and removed from site for treatment at construction / demolition and during operation.	
Environment Agency	The presence of SPZ's within development area is confirmed and noted in the Table 9-1. Please note that The Environment Agency would not know, or be made aware, of any private, or unlicensed abstractions, which may be within the scheme boundary. Local authorities regulate private water supplies and would hold	Details of PWS have been requested from North Yorkshire Council (formerly Selby District Council) and East Riding of Yorkshire Council, with data presented within this chapter. No PWS located within the 1 km Study Area is currently used for human consumption or food production purposes, based on the available data.	Refer to section 9.5 of this chapter for details of PWS.

Consultee	Summary of comment	How matter has been addressed	Location of response
	the details of these. All private water supplies used for human consumption or food production* purposes have an SPZ1 designation with a default radius of 50 metres. *Note, food production purposes do not include routine irrigation of crops.		
Environment Agency	Table 9-19 Importance of Receptors. We are pleased to note the recognition that the scheme is partly situated across a principal aquifer (the Sherwood Sandstone), and this has been given a 'high importance' classification in Table 9-19, which we support. Principal aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands. We also welcome the chapter on the impact of groundwater quality, levels and flow and the mitigation considerations that will be implemented	Noted.	Refer to section 9.5 for Importance of Receptors, section 9.6 for mitigation (including for groundwater) and section 9.7 for assessment of impact on groundwater quality, levels and flow.
Environment Agency	Embedded Mitigation 9.8.7 Good Practice Guidance (GPP) We welcome the good practice guidance included in Chapter 9, including the management of	Noted.	Refer to section 9.6 for mitigation including use of GPPs to inform the **Framework CEMP [EN010143/APP/7.7]** and requirement

Consultee	Summary of comment	How matter has been addressed	Location of response
	construction site run-off and spillage risk. […] 9.8.20. We would welcome the site-specific hydraulic fracture risk assessment.		for site-specific hydraulic fracture risk assessment.
Environment Agency	9.9.35. Dewatering activities could be included in the final CEMP when revised. This activity was previously exempt from requiring an abstraction licence. Since 1 January 2018, most cases of new planned dewatering operations above 20 cubic metres a day will require a water abstraction licence from us prior to the commencement of dewatering activities at the site. Please see Environment Agency guidance on when you need to apply for an abstraction licence.	Noted.	Requirements for permits and consents are described in section 9.6 of this chapter.
Environment Agency	We are supportive that the impacts of sea level rise are to be included in the FRA at ES stage, also that the requirements to update modelling to reflect climate change will also be undertaken (including EA requirements) at this stage.	Noted. Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** for details of the assessment. Further consultation has also been undertaken with the Environment Agency as outlined in 'Additional Engagement' below.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**
Environment Agency	9.6.13 We support that solar panels and field stations will be located	Noted. There will be areas with Solar PV Panels within Flood Zone 3, however, the	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**

Consultee	Summary of comment	How matter has been addressed	Location of response
	outside of flood zone 3 and that [Grid Connection] substations will be located in flood zone 1.	Scheme has been designed accordingly in order to remain operational during times of flood. Based on the design and embedded mitigation, the risk within these areas is considered low. Refer to the FRA for details of the assessment, which has been subject to ongoing consultation with the Environment Agency as outlined in 'Additional Engagement' below. As referenced above, Field Stations are not proposed to be located in Flood Zone 3, and Grid Connection Substations will be located in Flood Zone 1.	
Environment Agency	9.6.14 We are supportive of the modelling discussions being held with both the EA & LLFA to determine requirements, and that any modelling undertaken will be used to inform the FRA as part of the ES.9.7	Noted. Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** for details of the assessment. Further consultation has also been undertaken with the Environment Agency as outlined in 'Additional Engagement' below.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**
Environment Agency	We note that a full detailed FRA will be developed to support the ES. We can confirm that there are ongoing discussions with the applicant / LLFA with respect to climate change and modelling (1.3.3) and we will continue to offer support/guidance. We are supportive that the FRA takes into	Noted. Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** for details of the assessment. Further consultation has also been undertaken with the Environment Agency as outlined in 'Additional Engagement' below.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2**]

Consultee	Summary of comment	How matter has been addressed	Location of response
	account the DRAFT NPS guidance as well as current. We note that the development is classed as essential infrastructure and considers the higher central allowances. Also, that the applicant will undertake assessment with respect to the credible maximum scenario at the ES stage (4.2.9)		
Environment Agency	It is noted and supported that further information and mapping regarding historic flood event and recorded flood outlines will be included at ES stage.	Noted. Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** for details of the assessment including review of historic mapping.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])**
Environment Agency	Water Management Plan - We acknowledge the plan to produce a Water Management Plan for the works, but at time of review, this is not available. In the preparation of this document, please refer to The Environment Agency's approach to groundwater protection for guidance.	Noted. The Water Management Plan will be produced post consent as an appendix to the final CEMP.	The requirement for a Water Management Plan is secured in the **Framework CEMP [EN010143/APP/7.7]**.
Natural England	Potential water quality and water supply impacts on Special Protection Area (SPA) functionally linked land should be assessed in more detail in the Habitats Regulations Assessment (HRA), following completion of the relevant surveys.	An assessment of the likely significant effects of the Scheme on water quality and supply is undertaken in this chapter and where relevant, reported in the **Habitats Regulations Assessment (HRA) Report, ES Volume 7 [EN010143/APP/7.12]**.	Refer to section 9.7 of this chapter for assessment of water quality and the **HRA Report, ES Volume 7 [EN010143/APP/7.12]**

Consultee	Summary of comment	How matter has been addressed	Location of response
Natural England	Chapter 8, table 8-8 identifies that there may be hydrological connectivity between the proposed development land and Barn Hill Meadows SSSI. Natural England broadly welcomes the proposed mitigation measures for potential water quality impacts on Barn Hill Meadows SSSI. However, we advise that further information is included in the assessment, with regards to potential water quality and water supply impacts. Our above advice regarding internationally designated sites should be referred to where relevant in the context of the features of Barn Hill Meadows SSSI, details of which can be found at SSSI detail [on the Natural England website]	A water quality assessment is presented in section 9.7 of this chapter, including assessment of whether there would be any impact to downstream receptors such as the Barn Hill Meadows SSSI. It takes into account the **Framework CEMP [EN010143/APP/7.7]** for the construction stage and the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** at the operational stage, along with further design details (e.g. foul water management) outlined in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.	Refer to **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**, the **Framework CEMP [EN010143/APP/7.7]**, and **Framework Surface Water Drainage Strategy [EN010143/APP/6.2**] for further details of water management.
Canal and River Trust	Our consent as Navigation and Harbour Authority may be required for the installation of a new cable below the River Ouse. Please note that the Canal & River Trust is a statutory undertaker which has specific duties to protect the waterways. Accordingly, it is likely that we will resist the use of compulsory powers which may affect our undertakings. Accordingly, we require	The Scheme will cross the River Ouse via HDD and protective provisions for the benefit of the Canal and River Trust are included at Part 4 of Schedule 14 of the **draft DCO [EN010143/APP/3.1]**. Post-consent, any further approvals of plans will be governed by the terms of the protective provisions which include having regard to the Canal & River Trust's Code of Practice.	**Draft DCO [EN010143/APP/3.1]**

Consultee	Summary of comment	How matter has been addressed	Location of response
	that the acquisition of any rights over the River Ouse should be secured by agreement. The proposals include works in close proximity to the Trust's waterways. In our capacity as landowner, we wish to advise that the applicant/landowner would likely be required to comply with the Trust's 'Code of Practice for Works affecting the Canal & River Trust'.		
Canal and River Trust	We understand that the location of construction compounds and drilling apparatus on site have yet to be fully confirmed. We request that the CEMP should include measures to limit the risk of dust or silt-laden runoff towards the Ouse, which could otherwise impact our users. The use of silt traps and hoarding could be appropriate measures. The level of information required will depend on the location of works relative to the river.	Mitigation measures to manage silt-laden runoff are described in section 9.6 of this chapter and within the **Framework CEMP [EN010143/APP/7.7]**, where consideration of dust is also taken into account. An assessment of potential water quality impacts to watercourses resulting from construction site runoff (which may contain sediments or chemicals) is presented in section 9.7. The location of temporary construction compounds and HDD operations is presented in **Figure 2-4, ES Volume 3 [EN010143/APP/6.3]**	Mitigation with regards to the water environment is outlined in Section 9.6 of this chapter and assessment of water quality impacts in Section 9.7. Mitigation measures are also outlined in the **Framework CEMP [EN010143/APP/7.7].**
Ouse and Derwent IDB	Under the Land Drainage Act 1991 and the Boards' byelaws, the Board's prior written consent (outside of the planning process) is needed for:	Protective provisions for the benefit of drainage authorities have been included at Part 3 of Schedule 14 within the draft DCO **[EN010143/APP/3.1]** to afford	Scheme mitigation including watercourse buffers is described in Section 9.6. Assessment of impacts on the water environment (including water

Consultee	Summary of comment	How matter has been addressed	Location of response
	a. any connection into a Board maintained watercourse, or any ordinary watercourse in the Board's district. b. any discharge, or change in the rate of discharge, into a Board maintained watercourse, or any ordinary watercourse in the Board's district. This applies whether the discharge enters the watercourse either directly or indirectly (i.e. via a third party asset such as a mains sewer). c. works within or over a Board maintained watercourse, or any ordinary watercourse in the Board's district –for example, land drainage, an outfall structure, bridges, culverting etc. d. any construction, fencing or planting within 9 metres of the top of the embankment of a Board maintained watercourse. Please note that the Board does not, generally, own any watercourses and the requirement for you to obtain the Board's consent is in addition to you obtaining consent from any landowner	protection to their interests. A buffer of 10m has been included in the Scheme design around all watercourses except where crossings are required (and 30 m in the case of the River Ouse, River Derwent and unnamed drain (DE53)) and so access to all watercourses is maintained. Requirements for direct works to watercourses are described and any relevant effects assessed in this chapter. Drainage arrangements for Solar PV Area 1c (Grid Connection Substations) are described in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2**] and assessed within this chapter of the ES (section 9.7). It was agreed with the Ouse and Humber Drainage Board, who cover the Solar PV Site, that this was the only area of the Scheme requiring a Drainage Strategy.	quality and morphology) is undertaken in Section 9.7. Drainage arrangements are described for Solar PV Area 1c in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].** Requirements for permits and consents are described in Section 9.6 of this chapter.

Consultee	Summary of comment	How matter has been addressed	Location of response
	or other authority to carry out the relevant works.		
Ouse and Derwent IDB	The Board notes that open cut crossings are likely to be proposed for the watercourse crossings within our drainage district. On reviewing "Drain Names –Sheet 3 of 3 Figure 9-2" there appears to potentially be 6 watercourse crossings for the cable within our drainage district. The Board have had a lot of issues with open cut methods and especially on larger schemes in the past. For this reason, the Board would ask that directional drilling is used instead.	It is anticipated that none of the Ouse and Derwent IDB maintained watercourses will be crossed using open cut techniques and instead will be crossed using trenchless methodologies (i.e. HDD).	Details of watercourse crossings are provided in section 9.6 of this chapter and shown in **Figure 9-2, ES Volume 3 [EN010143/APP/6.3]**.
Ouse and Derwent IDB	Soakaways The Board always recommends that soakaways are first considered in accordance with the Planning Practice Guidance hierarchy for the management of surface water. The Board would therefore recommend:- i. Percolation Testing That the applicant be asked to carry out soakaway testing, in accordance	The **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** provides full details of drainage arrangements and has been developed in consultation with the Ouse and Humber Drainage Board, who cover the Solar PV Site. A detailed strategy will be provided post-consent, as secured through the DCO and following the detailed design of the Grid	Drainage arrangements are described in full in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].**

Consultee	Summary of comment	How matter has been addressed	Location of response
	with BRE Digest 365, in order to ascertain whether the soil structure is suitable for a soakaway system. ii. Soakaway Design Should the testing prove to be successful the applicant should then submit a design for the soakaway, for approval by the Lead Local Flood Authority ("LLFA") as the "approving authority" for soakaways, which should:- i. Storage volume should accommodate a 1:30 year event with no surface flooding (plus 30% allowance for climate change); and ii. Storage volume should accommodate no overland discharge off the site in a 1:100-year event (plus 30% allowance for climate change).	Connection Substations and informed by infiltration testing. There are no drainage requirements along the Grid Connection Corridor.	
Ouse and Derwent IDB	Discharge into a Watercourse The Board will only accept a discharge into a watercourse (directly or indirectly) where soakaways are not feasible. The below requirements apply when:	The **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** provides full details of drainage arrangements. There are no drainage requirements along the Grid Connection Corridor.	Drainage arrangements are described in full in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].**

Consultee	Summary of comment	How matter has been addressed	Location of response
	-There is a direct discharge to a watercourse -There is an indirect discharge to a watercourse –for example, through a private drainage system, or a mains sewer, which eventually discharges into a watercourse. Details of the Watercourse/ Sewer The Board would request details of: i. What the applicant is proposing to discharge into –for example, a watercourse. ii. The location of the proposed point of connection. Flow of the Watercourse. If the applicant is proposing to discharge directly (or through private drainage) into a watercourse, and if that watercourse is not maintained by the Board, we would ask: i. Where this watercourse is flowing to. A simple plan showing the route of the watercourse to the nearest Board maintained watercourse is usually sufficient. ii. Details of the condition of the watercourse to ensure the same is		

Consultee	Summary of comment	How matter has been addressed	Location of response
	flowing freely prior to any discharge. The applicant is responsible for ensuring that the watercourse is free flowing but we would ask that they walk along the watercourse and ensure there are no blockages. Photographs should be provided as evidence.		
Ouse and Derwent IDB	Flow Control Device. Whilst the Board is not the “approving authority” for flow control devices, we would request simple details as to what is proposed with regards to how the flow will be restricted to the agreed discharge rate.	The **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** provides full details of drainage. There is no drainage to watercourses required, and no drainage requirements along the Grid Connection Corridor and so no need for a flow control device.	Drainage arrangements are described in full in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].**
Ouse and Derwent IDB	Surface Water Storage System. Again, the Board is not the “approving authority” for surface water storage systems. However, we would request details of: i. The proposed surface water storage system (which we would usually recommend is impermeably lined); and ii. The proposed storage volume and accompanying calculations. The system should accommodate a 1:30	The **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** provides full details of surface water management (including attenuation storage) measures. **However,** there are no drainage or attenuation storage requirements along the Grid Connection Corridor in the Ouse and Derwent IDB area.	Drainage arrangements are described in full in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].** However, the Ouse and Derwent IDB area is unaffected and no attenuation storage is required.

Consultee	Summary of comment	How matter has been addressed	Location of response
	year event with no surface flooding (plus 30% allowance for climate change); and no overland discharge off the site in a 1:100-year event (plus 30% allowance for climate change). We would however recommend that a system should try and accommodate the full 1:100-year storm event (plus 30% allowance for climate change) wherever possible.		
Ouse and Derwent IDB	Outfall Structure. If there is a direct discharge to a watercourse and if that watercourse is within our district, the applicant should also provide details of the proposed outfall structure into the watercourse.	The **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** provides full details of drainage. There are no drainage requirements along the Grid Connection Corridor or any outfalls to watercourses required across the Scheme.	Drainage arrangements are described in full in the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2].**
Yorkshire Water	Water supply. A set of minimum standards has been provided to ensure adequate protection of the public water supply where apparatus is proposed to cross water mains or apparatus. This includes a minimum clearance of 150mm where apparatus crosses above or below a water main for main diameters up to 250mm. For mains of diameter greater than 250mm	The standards are noted and will be taken into account in the design and construction of the Scheme. This is also captured in the **Framework CEMP [EN010143/APP/7.7]**	Refer to Chapter 2 for further Scheme details (**Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**), and the **Framework CEMP [EN010143/APP/7.7]**

Consultee	Summary of comment	How matter has been addressed	Location of response
	Yorkshire Water requires a minimum clearance of 300mm where apparatus cross above or below these water mains.		
Yorkshire Water	Due to the proposal locating considerably outside the Yorkshire water groundwater asset Source Protection Zones it is if of no risk to the groundwater supply. In general, the proposal should be low risk as the foundations for the solar panels will not be expected at great depths. The electrical wiring will be unlikely to be oil filled and therefore no risk of leaching into the ground. Weed management would be the main concern, if weeds are expected to be cleared using a herbicide or similar spray which could leach into the ground. One query is the connector cable that stretches from Long Drax in the southwest. This lies in Source Protection Zone 3 for the Selby groundwater sources. Are there any details on the depths and materials this	With regard to weed management, the Applicant has identified options for the management of the grassland created within the solar farm. Further detail is provided in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1].** The **Framework CEMP, Framework Operational Environmental Management Plan (OEMP) [EN010143/APP/7.8] and Framework Decommissioning Environmental Management Plan (DEMP) [EN010143/APP/7.9]** contain measures for the appropriate storage and management of chemicals. As set out and secured in the **Framework CEMP, OEMP and DEMP**, should the use of herbicide or other spray chemical be required, a method statement, operating procedure or similar will be prepared prior to the work commencing, this will include measures to protect ground and surface water.	Refer to **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]** for further Scheme design details and the **Framework CEMP [EN010143/APP/7.7]** for best practice construction approaches to mitigate against any impact to surface water or groundwater. Section 9.7 of this chapter assesses the potential impacts on surface water and groundwater from construction practices. Refer also to the **OEMP [EN010143/APP/7.8]** and **DEMP [EN010143/APP/7.9]**

Consultee	Summary of comment	How matter has been addressed	Location of response
	is made of? Or has the cable already been laid?	Such work will only be carried out by suitably competent personnel. The Grid Connection Cables will be laid in a trench of 1.5 m width and at a typical depth of 1.2 m to 1.4 m (to ensure a minimum installation depth of 0.9 m (to top of cable)), with utility surveys to further inform positioning. Further detail is provided in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1].** Given the implementation of best practice installation as outlined in the **Framework CEMP [EN010143/APP/7.7]**, no significant effects have been identified to the SPZ.	
Yorkshire Water	Wastewater. On the statutory Sewer Map, there are no public sewers recorded to cross the proposal sites. However, there are public sewers not marked on Yorkshire Water's mapping records. Unmapped sewers may cross the proposal sites	Noted. Utility surveys will further inform final positioning of infrastructure associated with the Scheme.	Refer to **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]** for further Scheme design details.
East Riding of Yorkshire Council	The development would be classified as 'essential infrastructure' and is therefore a suitable form of development in Flood Zones 1 and 2. The Sequential test should be applied first to guide development to Flood	An **FRA** has been produced for the Scheme and is provided in **Appendix 9-3 ES Volume 2 [EN010143/APP/6.2]**.	Refer to the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1].**

Consultee	Summary of comment	How matter has been addressed	Location of response
	Zone 1 and then Zone 2 and then Zone 3. The application should therefore be accompanied by a sequential text to demonstrate where any development is located within Flood Zone 3, why other areas at lower risk of flooding have been explored first and are not suitable. You should also consider the need to avoid flood risk from sources other than rivers and sea. Within Flood Zone 3a and 3b the Exception test is required. In Flood Zone 3a, essential infrastructure should be designed and constructed to remain operational and safe in times of flood. In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to: • Remain operational and safe for users in times of flood, • Result in no net loss of floodplain storage, • Not impede water flows and not increase flood risk elsewhere.	Full details of the Sequential Test and Exception Test can be found in the **FRA (Appendix 9-3 ES Volume 2**). The Sequential Test is also discussed in **Chapter 3: Alternatives and Design Evolution** of this ES.	

Consultee	Summary of comment	How matter has been addressed	Location of response
	A Site-Specific Flood Risk Assessment is required for any development in medium and high-risk flood zones 2 and 3 and for any development in low-risk flood zone 1 if the site area exceeds 1ha.		

Additional Engagement

9.3.6 A freedom of information request was issued to the Environment Agency on 5 August 2022 to receive the latest baseline information and data relating to water resources, water quality, flood risk and WFD classification and investigations. A response was received on 7 September 2022 (Reference RFI/2022/275414). This data has been used to inform the baseline conditions presented in section 9.5 of this chapter.

9.3.7 Selby District Council[1] and East Riding of Yorkshire Council were contacted to provide details of Private Water Supplies (PWS) within the Study Area. Reponses have been received from both councils, with relevant PWS data included within section 9.5 of this chapter.

9.3.8 An initial meeting was held with the Environment Agency and East Riding of Yorkshire Council (as one of the Lead Local Flood Authorities (LLFAs)) for the Scheme on 3 February 2023. The outcomes of this meeting, including in relation to climate change and the requirements for additional hydraulic modelling, have been considered in the ongoing development of the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**. A further meeting was held with the Environment Agency and East Riding of Yorkshire Council on 29 September 2023. This discussed changes to the Scheme design since Statutory Consultation (submitted 09 May 2023) and presented the outcomes of the modelling and **FRA**. Additionally, permanent limitation of the degree of panel tilt to ensure a minimum 300mm freeboard in line with flood depths, as flood risk mitigation for all panels placed within Flood Zone 3, was presented. No comments or concerns were tabled by meeting attendees. The requirement for compensatory flood storage, due to the legs of the solar PV tables within Flood Zone 3, was also discussed. Even though this compensatory storage requirement is small the Environment Agency would like to see a betterment of the existing situation. Compensatory storage is further discussed in the **FRA.**

9.3.9 A meeting was held with the Environment Agency, East Riding of Yorkshire Council, North Yorkshire County Council, Ouse and Derwent IDB and Ouse and Humber Drainage Board on 15 March 2023. The approach to the PEI Report assessment, embedded mitigation for the water environment and initial outcomes of the provisional assessment were presented. Issues arising from the Scoping Opinion were also discussed. Further correspondence was undertaken with the Environment Agency following this meeting to clarify WFD classifications and the requirement for pre-construction water quality monitoring, as outlined in section 9.6.

9.3.10 The IDBs located within the Study Area were contacted to provide details of any hydraulic models for Ordinary Watercourses within the Study Area. Responses received to date include Thorntree IDB, who have confirmed the Scheme will not impact the Thorntree IDB area, and the Ouse and Derwent IDB, who confirmed only that the Grid Connection Corridor to the south of

[1] On 1 April 2023 North Yorkshire County Council and its six constituent District Councils (including Selby District Council) were merged to form North Yorkshire Council. Consequently, all correspondence undertaken up to end of March 2023 was with Selby District Council as the relevant Local Planning Authority at that time.

Hemingbrough, between the River Derwent and the River Ouse, is of relevance to the IDB and no hydraulic modelling is held by the IDB.

9.3.11 The administrative area of the Ouse and Humber Drainage Board covers the majority of the Order limits (with the Ouse and Derwent IDB covering the Grid Connection Corridor to the south of Hemingbrough, between the River Derwent and the River Ouse). A meeting was held with the Ouse and Humber Drainage Board on 17 August 2023 to agree the Scope of the **Framework Surface Water Drainage Strategy** (**Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**). Minutes of this meeting are presented as **Annex A of Appendix 9-4.** The Board confirmed that only Solar PV Area 1c, where both Grid Connection Substations will be located, required a Drainage Strategy.

9.3.12 A meeting was held with East Riding of Yorkshire Council and the Environment Agency on 29 September 2023 to provide an update on changes to the Scheme since the last meeting; and provide an overview of feedback received at Statutory Consultation. The main purpose of the meeting was to present a review of the FRA and its findings. Both the Council and the Environment Agency agreed to the approach taken to the FRA and the mitigation measures proposed where solar PV panels are located in Flood Zone 3. It was also agreed that there is a requirement for compensatory storage due to the floodplain volume lost to the legs of the solar PV tables.

9.3.13 On 16 October 2023 the Applicant submitted a request for information to the Environment Agency on the nature of flood defences at cable crossing locations at the River Ouse and River Derwent. This information will ensure that the design of the HDD accounts for and does not impact the integrity of the flood defences. The request has been logged and a response is awaited.

9.3.14 A meeting was held with East Riding of Yorkshire Council and North Yorkshire Council on 19 October 2023, to outline the latest water environment assessment approach and proposed mitigation measures, including assessment of water quality, hydromorphology and drainage. No significant concerns were raised during the meeting regarding the proposed approach.

9.4 Assessment Methodology

Assumptions, Limitations and Uncertainties

9.4.1 This assessment is based on baseline data and Scheme design information (see **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**) available and/or agreed for use within this ES chapter. A preliminary assessment was undertaken within the PEI Report. Following consultation responses to the PEI Report (as outlined in section 9.3), that assessment has been developed within this ES chapter while also taking into account further updates to the Scheme design and additional baseline data and modelling where available.

9.4.2 In September 2022, the Applicant requested water resources data (e.g., licensed abstractions, Water Activity Permit locations, pollution incident locations, groundwater levels etc.), WFD information, and water quality and flow data were to inform the desk-based study for the Scheme. A full

response was received and is taken into account within the assessment set out in this ES chapter. Data regarding PWS has been obtained from East Riding of Yorkshire Council and Selby District Council (now North Yorkshire Council). It is considered that sufficient baseline information has been gathered from the desk-based study to enable a robust assessment to be undertaken.

9.4.3 It has been confirmed that the River Ouse (HDD 6), River Derwent (HDD 3), Featherbed Drain (HDD 1), and an unnamed drain adjacent to the River Derwent (named by the Scheme as DE53) (HDD 5) will be crossed for cable installation using non-intrusive, underground techniques (i.e., HDD techniques that would not disturb the watercourse). HDD is also an option for cable routing for Loftsome Bridge Drain close to the A63 (HDD 4) (see **Chapter 3: Alternatives and Design Evolution, ES Volume 1**). There is also potential for non-intrusive crossings of drains off New Road for crossing the Drax cooling discharge pipeline (drains named OU27 and OU42 by the Scheme). However, as a worst case these latter two crossings have been assessed as using an intrusive open-cut methodology for the purposes of the assessment. HDD locations are presented in **Figure 2-4 and Figure 9-2, ES Volume 3 [EN010143/APP/6.3].**

9.4.4 All cables will be installed a minimum of 1.5 m below the bed of watercourses (excluding the River Ouse and River Derwent). Cables will be installed by HDD a minimum of 5 m below the bed of the River Ouse and River Derwent. The minimum installation depth of 1.5 m for Featherbed Drain, DE53 and Loftsome Bridge Drain will ensure that the channel is not disturbed or risk being exposed by future bed scour. Integrity of flood defences along the Rivers Ouse and Derwent would also be maintained with works undertaken in accordance with Environment Agency access requirements for future works to, and maintenance of, the flood defences. No works would be undertaken within 16 m of the landward toe of the flood defences, as set out in the **Framework CEMP [EN010143/APP/7.7].**

9.4.5 As a worst case for the assessment, it is assumed that all other watercourses crossings required for cables would be installed using an open cut technique. This is considered a reasonable worst-case assumption and follows a precautionary approach.

9.4.6 Where intrusive crossings of small watercourses are required, it is assumed that water flow would be maintained by temporarily damming the watercourse and either over pumping or fluming the flow through the works. Several of the ditches within the Site are thought to be ephemeral and if works could be carried out in the drier months this would reduce the risk of needing to manage flows, and the potential of water pollution (including propagating downstream of any impact). However, this cannot be guaranteed and thus no weight has been attributed to this in the impact assessment. The final crossing proposals for watercourses cable installation will be determined at the detailed design stage post-consent, when the contractor has been engaged and the relevant statutory stakeholders consulted.

9.4.7 Locations of watercourse crossings for the Interconnecting Cables and internal access roads are outlined in section 9.6. The number of new crossings has been reduced as far as practicable and no new culverts are proposed. Where existing culverts are to be used, it is assumed that some

strengthening and widening may be required. A worst case assumption has been applied that the maximum extension of existing culverts would be an additional 2.0 m width in each case.

9.4.8 Open span crossings will be used where no existing crossings are present, with the abutments set back from the top of the bank surrounding the watercourse.

9.4.9 The Scheme will be set back from all water features by at least 10 m to create a buffer zone (except where crossings are required), and 30 m in the case of the River Derwent, River Ouse and unnamed drainage ditch DE53. There would also be a buffer of 16 m from the landward toe of all flood defences. For small channel watercourses/agricultural drainage channels the buffer would be measured from the top of bank as required by IDBs (confirmed during consultation on 15 March 2023). This may require survey work (prior to construction) in some locations to adequately define and agree the top of bank position. For larger watercourses (i.e. the River Ouse and River Derwent) the buffer would be measured from the water's edge/channel extents under normal flow.

9.4.10 This buffer from water features will ensure all construction activities for the installation of solar PV panels would be offset from surface watercourses, other than where there is a need for crossing of a watercourse (such as for cabling installation or temporary access for construction for which mitigation is included). Any works to enhance watercourses would also require direct works to the channel and banks, although given the aim of these works, their small-scale and 'soft-engineering' nature, construction impacts would be minimal. Overall, the inclusion of this buffer reduces the risk of pollutants entering the watercourse directly, whilst also providing space for mitigation measures (e.g. fabric silt fences) where they are required and maintaining access (e.g. for the IDB).

9.4.11 The risk from surface water runoff to water features has been assessed qualitatively in this chapter on the basis of the **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**. The risk from surface water runoff from new hard standing (i.e. surfaces where diffuse urban pollutants may accumulate) to surface or groundwater features has been assessed according to the Simple Index Approach presented in the C753 The SuDS Manual (Ref. 9-31).

9.4.12 Runoff from the solar PV panels will also essentially be rainwater that will drain to the ground. As the panels are of a single axis tilting design, they will not focus surface water in specific areas and there will be no single 'drip track' from the panels (as occurs in fixed (non-tilting) panel arrangements). Maintenance visits will check for signs of developing flow paths and mitigate where necessary. The pollution risk from this runoff is minimal as solar PV panels do not contain any liquid (hazardous or not) that could contaminate rainwater.

9.4.13 As described in **Chapter 2: The Scheme of the ES [EN010143/APP/6.1]**, in the UK climate, solar PV panels are largely self-cleaning and deterioration in PV system output due to dust or dirt is generally low. The requirement for, and the frequency of, cleaning of the solar PV panels due to the build-up of dust and dirt varies depending upon site- specific conditions. Therefore, as a worst case it is assumed that the solar PV panels will be cleaned on two-yearly cycles (although the period between cleaning can be much longer). As

the use of cleaning products (chemicals) can damage panels and void manufacturer's warranties, no cleaning products would added to the water for panel cleaning. This is secured in the **Framework OEMP [EN010143/APP/7.8]**. Panel cleaning will therefore not lead to any significant pollution risk. See also paragraph 9.4.22.

9.4.14 The solar PV panels and Field Stations will predominantly be located outside the Flood Zone 2 and 3 extents. However, there are solar PV panels and Field Stations within Flood Zone 2 (Solar PV Area 1f, 2a, 2c, 2d, 3a, 3b) and solar PV panels only in Flood Zone 3 (Solar PV Area 1e and 2a). These have flood resistance and resilience measures included within the design as advised by the FRA. Associated substations will be located in Flood Zone 1. The FRA is presented in **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and also see **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**.

9.4.15 The **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** are based on desktop surveys, Site walkover, Site layout proposals and modelling outcomes where appropriate. Where topographical data was not available, LiDAR data was used to inform these documents. The LiDAR data is of sufficient quality to not limit the conclusions provided in these documents to date.

9.4.16 With regard to flood risk, temporary works are not assessed unless they have the potential to adversely affect flood risk or impact the quality or form of waterbodies. The temporary works where such risks are considered to have potential adverse effects on flood risk or the water environment (for example, excavations for the Grid Connection Corridor), are identified and assessed within the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2])** and impact assessment (within this chapter).

9.4.17 The design life of the Scheme is 40 years, with decommissioning to commence 40 years after final commissioning. As stated in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**, operation is anticipated to commence in 2027 and in this case, decommissioning would be in 2067. However, should a later start or extended construction programme be required (consequently affecting the final decommissioning date) this would not be expected to affect the assessment outcomes presented in this chapter.

Matters Scoped In/Scoped Out

Water Supply

9.4.18 Any assessment of potential impacts on public potable water supply from the Scheme has been scoped out of this chapter. It has been scoped out since the Scoping Report was submitted on the basis of new design information, as described below.

9.4.19 The Study Area is wholly within the Yorkshire Water supply area. 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. 9-42).

9.4.20 During construction it is envisaged that a temporary potable water supply will be provided. An estimated 35,000 m^3 total of potable water will be required during construction to support welfare facilities onsite and other uses, or an

approximate 1,800 m^3 per month during peak months. The water required for the Johnson's Farm operation and maintenance hub in Solar PV Area 1e will be taken from the existing mains water connection. As there will not be a new formal supply required, assessment of water supply during construction has not been considered further given that it would not be expected to have an appreciable impact on water resource provision in the area.

9.4.21 The Scheme will contain solar PV technology with no residential usage of water required in the long term. It is anticipated that there will be up to three permanent staff on-site at any one time during the operational phase, based at the permanent offices at Johnson's Farm. Additional staffing/visitors such as maintenance workers and deliveries will be ad hoc as needed. It is assumed that this will equate to four days of additional worker time per month. This will have a very minor impact on local potable mains water supplies.

9.4.22 With regard to operational panel cleaning, this would be undertaken using a tractor mounted system with a rotating 'car-wash' type brush. It is anticipated that water would be brought to site in 1 m^3 (one tonne/1,000 litres (l)) Intermediate Bulk Containers (IBCs). Individual IBCs would be mounted on the rear of the tractor to provide water supply during cleaning. Based upon cleaning water usage on similar schemes it is estimated that the cleaning will require 250 millilitres (ml) of water per panel per cycle and that, assuming cleaning of all panels is required (824,121 panels), the total volume of cleaning water per cleaning cycle would be approximately 206,030 l (206 m^3). A two-year cleaning cycle is expected (see also paragraph 9.4.13 above and **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**).

9.4.23 Given that no new permanent operational water connection to mains supply is required and that water use by the Scheme is relatively light, the assessment of potable water supply during operation has not been considered further.

Foul Water

9.4.24 Foul water from the operations and maintenance hub at Johnson's Farm and from the operations building at the Grid Connection Substations will be drained to a septic tank which will be emptied regularly under contract with a registered recycling and waste management contractor. Until these permanent facilities are installed, temporary welfare facilities will store foul water which again would be emptied and removed from site by a specialist 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.

Nutrient Neutrality

9.4.25 East Riding of Yorkshire Council is an LPA affected by nutrient pollution (nutrient enrichment from elevated nitrogen and phosphorus levels) whereby reduced water quality is leading to adverse nutrient impacts on some designated habitats sites (Ref. 9-42). New developments in the catchments of these affected habitats sites are required to show that they are nutrient neutral (i.e. do not contribute any additional nutrients to the habitats site). However, within the county this only occurs in relation to the Hornsea Mere SPA site and there is no hydrologic connectivity between this designated site and the Scheme (as they are in different catchments). Watercourses from

the Site drain to the Humber Estuary and whilst the Humber Estuary is also a designated site (SPA, SAC, Ramsar) it is not currently listed as a site requiring nutrient neutrality assessment in Natural England's letter providing nutrient neutrality advice to the Chief Planner issued in March 2022 (Ref. 9-43).

9.4.26 Furthermore, it is noteworthy that as the Scheme will remove the use of pesticides and fertilisers on land within the Solar PV Site it will reduce the runoff of nutrients into the surrounding watercourses. Welfare facilities for construction staff will be temporary and will not discharge into the sewerage network, whilst the permanent welfare facilities at Johnson's Farm will be drained to a septic tank which will be emptied regularly under contract with a registered recycling and waste management contractor.

9.4.27 It is concluded therefore that in line with Natural England advice (Ref. 9-43), nutrient neutrality assessment can be scoped out of the assessment. The Planning Inspectorate agreed with this approach in the scoping opinion (refer to section 9.3 of this chapter and **Table 9-1**).

Waterbodies

9.4.28 The Barmby WFD reportable waterbody (WFD ID: 30430722) (Barmby Reservoir) is located adjacent to the River Derwent northeast of Barmby on the Marsh. It is within 1 km of the Grid Connection Corridor, but is on the opposite side of the River Derwent to the Grid Connection Corridor. As the waterbody is isolated from any construction, operation or decommissioning works and not online (i.e. hydrologically connected) to any watercourse that might be affected by the works, it is scoped out of further assessment.

Study Area

9.4.29 For the purposes of this assessment, a general Study Area of 1 km around 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. This Study Area is shown in **Figure 9-1, ES Volume 3 [EN010143/APP/6.3]**.

9.4.30 Watercourses flow and so water quality and flood risk impacts may propagate downstream. As such, water environment impact assessments will sometimes consider a wider Study Area extending to as far downstream as a potential impact may influence the quality or quantity of the water body or water dependent designated nature conservation site. In this case, watercourses across the Study Area drain towards the River Foulness, River Derwent and River Ouse, and so these are considered the final receiving waterbodies that could conceivably be affected. These are all within the 1 km of the Order limits. As such, a 1 km buffer around the Order limits is considered appropriate for the Study Area.

Methodology

9.4.31 This section describes the methodology used for the assessment of effects of the Scheme on the water environment, including the criteria for the determination of the importance 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:

a. 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;

b. 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 (potentially including cables, although the option of cables remaining in-situ is also a possibility, as further discussed in **Chapter 2: The Scheme, E Volume 1 [EN010143/APP/6.1]**). As such, decommissioning impacts are considered the same as construction as a worst case given implementation of a detailed DEMP (as secured through the **Framework DEMP [EN/010143/APP/7.9]** and which is presented with the DCO Application);

c. 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

d. Reviewing any residual impacts.

Sources of Information

Desktop Research

9.4.32 The water environment baseline conditions have been determined by a desk study of available Site and Scheme information, and a range of online data sources including:

a. Online Ordnance Survey (OS) maps viewed to identify any surface waterbodies within 1 km of the Order limits (Ref. 9-44);

b. Online aerial photography (Ref. 9-45);

c. Part 1: Humber River Basin District River Basin Management Plan (Ref. 9-46);

d. Environment Agency Catchment Data Explorer Tool (Ref. 9-47);

e. British Geological Survey (BGS) Geoindex website (Ref. 9-48);

f. Defra’s Multi-agency geographical information for the countryside (MAGIC) website (Ref. 9-49);

g. National River Flow Archive (NRFA) website (Ref. 9-50);

h. Natural England website for designated sites (Ref. 9-51);

i. The Cranfield University Soilscape website (Ref. 9-52);

j. The Met Office website (Ref. 9-53);

k. Environment Agency’s Water Quality Archive website (Ref. 9-54);

l. Environment Agency's Fish and Ecology Data viewer website (Ref. 9-55)

m. UK Government's Flood Map for Planning (Ref. 9-56); and

n. UK Government's Long Term Flood Risk Mapping (Ref. 9-57).

9.4.33 In addition, and as outlined above, further information and data have been obtained directly from the Environment Agency (water quality, resources, pollution incidents, abstraction licences, water activity permits, and biological data[2]). Information on PWS was obtained from Selby District Council[3] and East Riding of Yorkshire Council in autumn 2022. East Riding of Yorkshire Council also provided hydraulic modelling data for use in development of the FRA.

Surveys

9.4.34 A Site walkover was undertaken on 30 November 2022 in fair weather conditions. The aim of this site visit was to assess watercourse connectivity, quality, and condition, and included watercourses within the Solar PV Site, Interconnecting Cable Corridor and Grid Connection Corridor. This survey covered the Site Boundary as described at the time of survey and while changes have since been made to the Order limits, the survey covered the waterbodies that might be affected by the Scheme and has since been supported by further observations undertaken as part of the development of the **Aquatic Ecology Baseline Report (Appendix 8-4, ES Volume 2 [EN10143/APP/6.2**], thus ensuring that survey findings remain valid.

9.4.35 Water quality surveying has not been undertaken given that the water bodies associated with the Scheme are generally minor. It is considered that the nature of the Scheme, having a relatively light footprint and limited ground works, does not warrant a water quality monitoring programme. Water quality of the more significant watercourses adjacent to the Order limits and beyond the Scheme has been determined with reference to background water quality data from routine Environment Agency monitoring.

9.4.36 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 so does not solely rely on water quality due to the principle that by law no controlled water may be polluted (i.e. no matter what the baseline water quality is there should be no pollution from the Scheme). 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). Furthermore, pre-construction monitoring of potentially affected watercourses would be required and is detailed later in this chapter.

[2] The Environment Agency also provided hydraulic modelling data, but this was corrupted and was not possible to use for the assessment.
[3] On 1 April 2023 North Yorkshire County Council and its six constituent District Councils (including Selby District Council) were merged to form the Unitary Authority of North Yorkshire Council. Consequently, all correspondence undertaken up to end of March 2023 was with Selby District Council as the relevant Local Planning Authority at that time.

Impact Assessment Methodology

Source-Pathway-Receptor Approach

9.4.37 Based on professional judgement and experience of other similar Solar DCO schemes (including Sunnica Energy Farm, Longfield Solar Farm and Gate Burton Energy Park), a qualitative assessment of the likely significant effects on surface water quality and water resources has been undertaken.

9.4.38 The predominantly qualitative assessment of likely significant effects has considered the construction, operation, and decommissioning phases of the Scheme, as well as cumulative effects with other developments. It is based on a source-pathway-receptor approach.

9.4.39 For an impact on the water environment to exist, the following is required:

a. 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);

b. A receptor that is sensitive to that impact (i.e. water bodies and the services they support); and

c. A pathway by which the two are linked.

9.4.40 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.

9.4.41 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 by any of the impact sources identified. Water bodies, including their attributes, have been identified through desk study and site survey.

9.4.42 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).

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

Hydromorphology

9.4.44 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.

9.4.45 Consideration has been given to how the Scheme is likely to impact upon the WFD objectives for the relevant watercourses within **Appendix 9-2 Water Framework Directive Assessment, ES Volume 2 [EN010143/APP/6.2]**. Morphological effects are described within this chapter according to the method for determining effect significance as described later in this section.

Framework Surface Water Drainage Strategy

9.4.46 A **Framework Surface Water Drainage Strategy, Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** has been prepared to support the DCO Application. Furthermore, delivery of a detailed Surface Water Drainage Strategy informed by infiltration testing is secured as a requirement of the DCO (see **draft DCO [EN010143/APP/3.1]**). The Framework Surface Water Drainage Strategy comprises a concept design of the system, proposing attenuation features, to mimic the natural flow regime as far as practicable whilst reducing flood risk. The strategy includes:

a. Estimation of surface water attenuation and storage techniques; and

b. Potential locations for above ground surface water attenuation.

Assessment of Surface Water Runoff for the Operational Phase

9.4.47 There is relatively little additional hardstanding to be introduced as a result of the Scheme. Additional areas of hardstanding are predominantly found within Solar PV Area 1c where the two Grid Connection Substations will be located. The Grid Connection Substation compound will include areas of hardstanding, access roads, a small parking area, switchrooms and a shared operations building as further described in **Chapter 2: The Scheme, ES Volume 1 [EN0101143/APP/6.1].**

9.4.48 Surface water runoff from the additional areas of hardstanding 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. An assessment is therefore undertaken to determine the potential risk to the receiving waterbodies and to inform the development of suitable mitigation and treatment measures.

9.4.49 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. 9-31). The Simple Index Approach follows three steps:

a. Step 1 – Determine suitable pollution hazard indices for the land use(s);

b. 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

c. Step 3 – If the discharge is to a water body protected for drinking water, consider a more precautionary approach.

9.4.50 The SuDS Manual (Ref. 9-31) 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 category will be selected.

Flood Risk Assessment

9.4.51 A site-specific **FRA** (**ES Volume 2: Appendix 9-3 [EN010143/APP/6.2]**) has been prepared for the Scheme. This has been prepared in accordance with the requirements of NPS EN-1; NPS EN-3; revised draft NPS EN-1; and revised draft NPS EN-3; as well as the NPPF and accompanying guidance and relevant regional and local policy and guidance. It has also considered consultation with the Environment Agency, LLFA and IDBs.

9.4.52 The FRA 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 **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**.

Water Framework Directive Assessment

9.4.53 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:

a. Cause a deterioration of a water body from its current status or potential; and/or

b. Prevent future attainment of Good status (or potential where not already achieved).

9.4.54 The following guidance on how to undertake WFD assessments has been used to inform the assessment presented in **Appendix 9-2 Water Framework Directive Assessment, ES Volume 2 [EN010143/APP/6.2]:**

a. Environment Agency Advice Note – Water Framework Directive Risk Assessment: How to assess the risk of your activity (Ref. 9-58); and

b. The Planning Inspectorate Advice Note 18: The Water Framework Directive (Ref. 9-59).

9.4.55 The assessment was 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 Scheme 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, the third stage involves a full impact assessment, including consideration of the criteria for derogation (if one is expected to be required) as outlined in Regulation 19 of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 9-8).

9.4.56 **Appendix 9-2 Water Framework Directive Assessment, ES Volume 2 [EN010143/APP/6.2]** presents the full WFD assessment for the Scheme (Stage 1 to 3 as appropriate).

Determining the Significance of Effects

9.4.57 The significance of effects is 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. 9-60) and LA 104 Environmental Assessment and Monitoring (Ref. 9-61), 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 criteria that will be used to determine receptors' importance are presented in **Table 9-3**.

9.4.58 In a change to the standard methodology set out in **Chapter 5: Environmental Impact Assessment (EIA) Methodology, ES Volume 1 [EN010143/APP/6.1]** whilst other disciplines may consider 'receptor sensitivity', 'receptor importance' is considered when determining the significance of effects on the water environment. 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[4] from being polluted.

9.4.59 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. A level of importance (low to very high) is assigned to the water resource receptor based on a combination of attributes (such as the size of the watercourses, WFD designation, water supply and other uses, biodiversity, and recreation etc.) and on receptors to flood risk based on the vulnerability of the receptor to flooding;

b. 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 9-4** and the assessor's professional judgement. Embedded or standard mitigation measures are taken into account in the initial assessment, but any other mitigation is not considered until the assessment of residual effects; and

c. 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 9-5**. 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.

[4] In England and Wales, the main water pollution offences are contained in the Environmental Permitting (England and Wales) Regulations 2016

Table 9-3. Criteria to Determine Receptor Importance (Adapted from DMRB LA113; Ref. 9-60)

Importance	General Criteria	Surface Water[A]	Groundwater	Hydromorphology[B]	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.	European Communities (EC) Designated Salmonid / Cyprinid fishery; Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95[5] ≥ 1.0 m^3/s; site protected / designated under EC or UK habitat legislation (SAC, SPA, SSSI, Water Protection Zone (WPZ), Ramsar site. 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 Groundwater Dependent Terrestrial Ecosystems (GWDTE); Water abstraction: greater than 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 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	Watercourse having a WFD classification as shown in a RBMP and Q95 less than 1.0 m^3/s; Major Cyprinid Fishery; Species protected under EC or UK habitat legislation. Critical social or	Principal Aquifer providing locally important source supporting rover ecosystem; SPZ2; Groundwater supports GWDTE; Water abstraction: 500 to 1,000 m^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	Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding;

[5] Q95 flow is the flow rate that is exceeded 95% of the time.

Importance	General Criteria	Surface Water[A]	Groundwater	Hydromorphology[B]	Flood Risk
	national importance.	economic uses (e.g. water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.		and/or catchment development pressures.	Flood Zone 3a; More vulnerable development. High risk from non-fluvial flood sources.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.	Watercourse detailed in the Digital River Network but not having a WFD classification as shown in a RBMP. May be designated as a Local Wildlife Site (LWS) and support a small / limited population of protected species. Limited social or economic uses.	Secondary Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ 3; Water abstraction: 50 to 499 m^3/day.	Shows signs of previous alteration and/or minor flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	Floodplain or defence protecting 10 or fewer 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.	Surface water sewer, agricultural drainage ditch; non-aquifer WFD Class ‘Poor’ or undesignated in its own right. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.	Generally Unproductive strata. Water abstraction: less than 50 m^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 channelised with hard bank	Floodplain with limited constraints and low probability of flooding of residential and industrial properties; Flood Zone 1; Water compatible development.

Importance	General Criteria	Surface Water[A]	Groundwater	Hydromorphology[B]	Flood Risk
				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	Low risk from non-fluvial flood sources
Negligible	The receptor is resistant to change and is of little environmental value.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Note A: Professional judgement is applied when assigning an importance category to all water features. The WFD status of a watercourse is not an overriding factor and, in many instances, it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and WFD targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, but this does not mean that a poorer quality discharge can be emitted. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 (Ref. 9.11) and the Water Resources Act 1991 (Ref. 9.11) (each as amended), and future WFD targets also need to be considered.

Note B: Based on the water body ‘Reach Conservation Status’ presently being adopted for another major infrastructure project (and developed originally by Atkins) and developed from EA conservation status guidance (Environment Agency, 1998a; 1998b (Ref. 9-62 and Ref. 9-63) as LA113 (Ref. 9-60) does not provide any criteria for morphology.

9.4.60 The magnitude of impact will be determined based on the criteria in **Table 9-4**, taking into account 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 the assessment of potential impacts to water bodies only, as likelihood is inherently included within the **FRA**, **Appendix 9-2, ES Volume 2 [EN010143/APP/6.2].**

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

a. Negligible: an imperceptible effect or no effect to a water resources receptor;

b. Beneficial: a beneficial/positive effect on the quality of a water resource receptor; or

c. Adverse: a detrimental/negative effect on the quality of a water resources receptor.

9.4.62 In the context of this assessment, an effect can be temporary or permanent, with effects quantified temporally as per **Chapter 5: EIA Methodology, ES Volume 1 [EN010143/APP/6.1]:** short-term (up to 12 months after construction or decommissioning), medium term (endures for one to five years after construction or decommissioning) and long-term (endures for more than five years after construction or decommissioning).

9.4.63 At a spatial level, ‘local’ effects are those affecting the Site and neighbouring receptors, while effects upon receptors beyond the vicinity of the Site 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.

9.4.64 The importance of the receptor (**Table 9-3**) and the magnitude of impact (**Table 9-4**) are determined independently from each other and are then used to determine the overall significance of effect (**Table 9-5).** Options for mitigation will be considered and secured where possible to avoid, minimise and reduce adverse impacts, particularly where significant effects may otherwise occur. The residual effects of the Scheme with identified mitigation in place will then be reported. Effects of moderate or greater magnitude are considered significant. Where there is a range of potential effect (e.g. Large or Very Large) in Table 9 5, professional judgement is exercised to determine the most suitable effect.

Table 9-4. Magnitude of Impact Criteria (adapted from DMRB LA 113, Ref. 9-60)

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 a 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 greater than 100 mm. Change in flood risk to receptor from low or medium to high. Permanent adverse effect on local drainage system and subsequent capacity implications.
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:

Magnitude of Impact	Description	Examples
		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 greater than 50 mm Change in flood risk to receptor from low to medium. Severe temporary adverse effect on local drainage system and subsequent capacity issues.
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 greater than 10 mm Change in flood risk to receptor from no risk to low risk. Minor effect on local drainage system and subsequent capacity issues.
Negligible	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity.	Surface / Groundwater: The proposed project is unlikely to affect the integrity of the water environment. Flood Risk: Negligible change to peak flood level (less than or equal to +/- 10 mm). No change in flood risk to the receptor.

Magnitude of Impact	Description	Examples
		Negligible change on local drainage system.
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 (greater than 10 mm). Change in flood risk to receptor from low risk to no risk. Minor reduction in surface water run-off and subsequently the impact on the local drainage system.
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 (greater than 50 mm). Change in flood risk to receptor from medium to low. Moderate reduction in surface water run-off and subsequently the impact on the local drainage system.

Magnitude of Impact	Description	Examples
Major beneficial	Results in major improvement of attribute quality	Surface Water: Removal of existing polluting discharge, or of 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 (greater than 100 mm). Change in flood risk to receptor from high to medium or low. Major reduction in surface water run-off and subsequently the impact on the local drainage system.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.	

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

a. Negligible: an imperceptible effect or no effect to a water resources receptor;

b. Beneficial: a beneficial/positive effect on the quality of a water resource receptor; or

c. Adverse: a detrimental/negative effect on the quality of a water resources receptor.

9.4.66 In the context of this assessment, an effect can be temporary or permanent, with effects quantified temporally as per **Chapter 5: EIA Methodology, ES Volume 1 [EN010143/APP/6.1]**: short-term (up to 12 months after construction or decommissioning), medium term (endures for one to five years after construction or decommissioning) and long-term (endures for more than five years after construction or decommissioning).

9.4.67 At a spatial level, 'local' effects are those affecting the Site and neighbouring receptors, while effects upon receptors beyond the vicinity of the Site 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.

9.4.68 The importance of the receptor (**Table 9-3**) and the magnitude of impact (**Table 9-4**) are determined independently from each other and are then used to determine the overall significance of effect (**Table 9-5**). Options for mitigation will be considered and secured where possible to avoid, minimise and reduce adverse impacts, particularly where significant effects may otherwise occur. The residual effects of the Scheme with identified mitigation in place will then be reported. Effects of moderate or greater magnitude are considered significant. Where there is a range of potential effect (e.g. Large or Very Large) in **Table 9-5**, professional judgement is exercised to determine the most suitable effect.

Table 9-5. Matrix for Assessment (Adapted from LA113; Ref. 9-60)

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
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

9.5 Baseline Conditions

9.5.1 This section describes the baseline environment within the Study Area with specific reference to Flood Risk, Drainage and Surface Water, and identifies any sensitive receptors and their individual importance.

Existing Baseline

Surface Watercourses

9.5.2 Given the interconnecting and often wide-reaching nature of watercourses, they have been considered for the Scheme as a whole (rather than splitting between the different elements of the Scheme as identified on **Figure 1-3, ES Volume 3 [EN010143/APP/6.3]** (i.e., Solar PV Site, Grid Connection Corridor, Interconnecting Cable Corridor, Ecology Mitigation Area and Site Accesses). Multiple watercourses on the Solar PV Site are tributaries of the River Derwent and so have potential to influence the Derwent itself or River Ouse downstream.

9.5.3 For the remainder of this baseline section (covering water resources, hydrogeology and flood risk), the Scheme has been considered as two main parts. Firstly, the baseline describes collectively the Solar PV Site, Interconnecting Cable Corridor, Ecology Mitigation Area and associated Site Accesses (where they are within 1 km of these areas) as the 'Solar PV Site Study Area'. Secondly, the baseline describes the 'Grid Connection Corridor Study Area', including associated Site Accesses which are over 1 km from the various parts of the Grid Connection Corridor.

9.5.4 Where relevant, waterbodies and their attributes have been presented in a series of figures that support this chapter. **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]** presents surface water features and related water resource information and attributes; **Figure 9-2, ES Volume 3 [EN010143/APP/6.3]** shows the names of the numerous drains across the Site; **Figure 9-3, ES Volume 3 [EN010143/APP/6.3]** shows groundwater features and related attributes**; Figure 9-4, ES Volume 3 [EN010143/APP/6.3]** shows Fluvial Flood Risk Zones (based on Environment Agency mapping); and **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]** shows Surface Water Flood Risk (based on Environment Agency mapping).

Topography, Land Use and Climate

9.5.5 The topography of the Study Area is relatively flat with existing elevation ranging less than 10 m Above Ordnance Datum (AOD), and largely associated with flood plains of the River Ouse, River Derwent and River Foulness.

9.5.6 The land use within the Study Area generally consists of a mosaic of arable farmland, with some areas of pasture, interspersed with individual trees, hedgerows, tree belts (linear) small woodland blocks and farm access tracks. There is an industrial development to the west of Drax village that consists of Drax Power Station and the National Grid Drax Substation complex. Drainage ditches and small watercourses are ubiquitous across the area and are generally heavily modified or artificial in nature as a result of the surrounding agricultural and drainage practices. There are several villages and hamlets located throughout the Study Area. Towards the middle

of the Study Area is the village of Spaldington, and toward the northern boundary of the Scheme area is the village of Willitoft and hamlet of Gribthorpe. See also **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

9.5.7 The Grid Connection Corridor connects the Grid Connection Substations in Solar PV Area 1c to the National Grid Drax Substation to the south-west and intersects the River Ouse and the River Derwent. The villages of Drax and Barmby on the Marsh are situated to the east of the Grid Connection Corridor.

9.5.8 The nearest Meteorological Office weather station is located at Leconfield Sar (NGR TA 0125 4360), approximately 28 km north-east of the village of Spaldington, based on data from the Meteorological Office website (Ref. 9-53). Based on data from this weather station for the period 1991–2020 (as shown in **Plate 9-1**), the Study Area receives approximately 661 mm of rainfall per annum, with it raining more than 1 mm on approximately 124 days per year, which are both low in the UK context. Rainfall is highest from early Summer through to mid-Winter and generally peaks in June, October and November, with the least rainfall falling in March on average.

9.5.9 The same weather station reports that the area generally receives around 41 days of air frost per year, distributed across all months except July, August and September, whereas the majority occurs in the months of December through to February (inclusive).

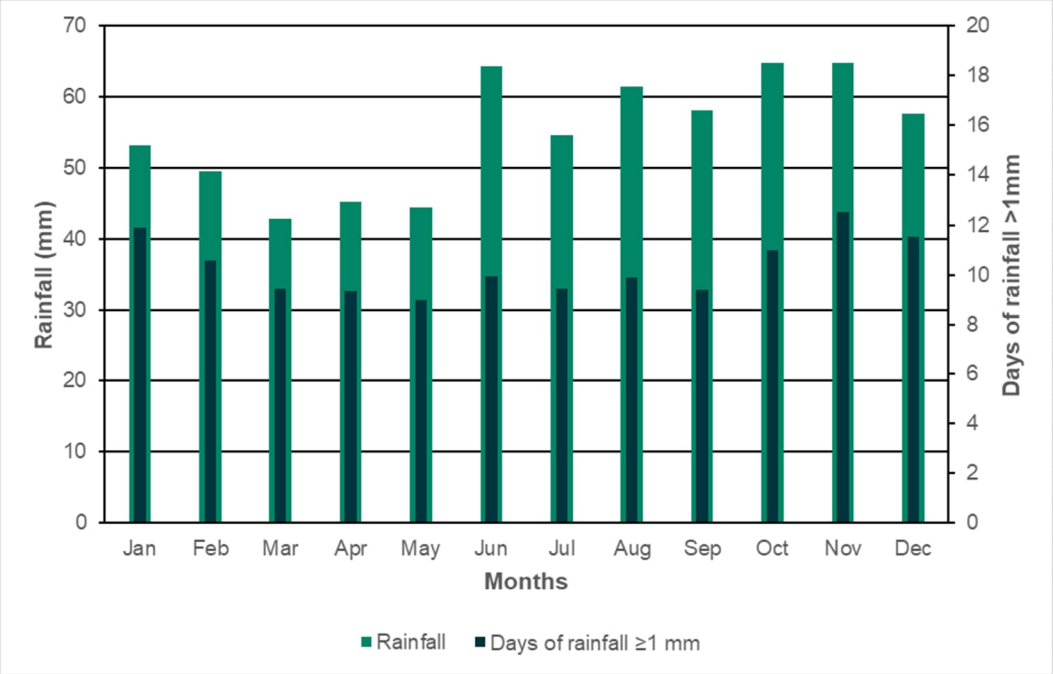

Plate 9-1. Leconfield Sar weather station: monthly rainfall and days of rainfall greater than 1 mm between 1991–2020 (Ref. 9-53)

Surface Water Features

9.5.10 The Study Area is situated within the Humber River Basin District and extends across three Management Catchments, namely: the Derwent Humber; Hull and East Riding; and Wharf and Ouse Lower Management Catchments. All watercourses in the Study Area ultimately drain to the River Humber (Humber Upper WFD waterbody within the Humber Transitional and

Coastal (TraC) Management Catchment) although it is not in the Study Area itself.

9.5.11 The River Ouse flows eastwards through the southern part of the Study Area, with the River Derwent (Humber) flowing into the River Ouse to the north-west of the Drax area. There are five surface water WFD reportable waterbodies (as determined by the Environment Agency) in the Study Area:

a. Ouse from River Wharfe to Upper Humber Water Body (GB104027064270) – Main River;

b. Derwent from Elvington Beck to River Ouse Water Body (GB104027068311) – Main River;

c. Fleet Dike catch (tributary of Ouse) Water Body (GB104027063630) – Ordinary Watercourse;

d. Barmby (lake) Water Body (GB30430722) – Reservoir; and

e. Foulness from Black Beck to Market Weighton Canal Water Body – Ordinary Watercourse (GB104026066690).

9.5.12 These catchments and named WFD surface water bodies are shown in **Figure 9-1, ES Volume 3 [EN010143/APP/6.3]**. Further details for each of the WFD reportable waterbodies are given in **Table 9-6**.

9.5.13 The following WFD reportable waterbodies have also been considered in the baseline due to the fact that there is hydrological connectivity to them from watercourses within the Order limits or because their wider catchment overlaps with the Study Area:

a. Humber Upper (GB530402609203) – transitional waterbody (estuary);

b. Aire from Fryston Beck to River Ouse Water Body (GB104027063037) – Main River; and

c. Birk Lane Drain Catch (tributary of Derwent) (GB104027063430) – Ordinary Watercourse.

9.5.14 There are many named and unnamed agricultural drains which are ubiquitous across the Study Area (see **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**), all of which are ordinary watercourses. Named watercourses that have been identified on the basis of Ordnance Survey mapping are listed in **Table 9-6**.

9.5.15 There are a number of smaller waterbodies within the Study Area, around Solar PV Areas 3b and 3c, which do not fall within any of the reportable WFD surface waterbody catchments listed above, but which are mapped within the Foulness Operational Catchment on the Environment Agency's Catchment Data Explorer website (Ref. 9-47). Mapping indicates that numerous of these would drain to the Humber Upper WFD transitional waterbody (GB530402609203) despite not having been included in the catchment designation, hence its inclusion in the baseline.

9.5.16 Based on the site visit, the vast majority of the smaller ordinary watercourses including those listed in **Table 9-6** are of a highly modified or artificial character, with extensive straightened sections, and are likely to be subject to ongoing dredging activity. 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 Derwent and Ouse. Consequently, the watercourses are often grossly over-deepened, trapezoidal ditches, with very little hydraulic variation. Channel substrate is predominantly silt, often with little or no gravel present, resulting in essentially no variance of bedform throughout.

9.5.17 There are various natural and artificial ponds and lakes throughout the Study Area, but not within the Order limits. These include:

a. Barmby Reservoir at Barmby Marsh – a reportable WFD waterbody (see **Table 9-6**) located adjacent to the River Derwent on its eastern side;

b. A series of lakes that appear to be associated with Foggathorpe House and Foggathorpe Hall;

c. Several small ponds associated with farms around Spaldington as well as Winfield Lakes which are used for fishing; and

d. A number of small artificial waterbodies at Drax Power Station.

9.5.18 In addition, there are a number of small agricultural ponds across the Study Area.

Table 9-6. WFD surface waterbodies in the Study Area

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
Ouse from River Wharfe to Upper Humber (GB104027064270)	Moderate (2022)	Fail (2019) Does not require assessment (2022)	Good (2027)	Heavily modified	This reportable reach extends from close to Ricall at the upstream extent and flows in a generally south-easterly direction to the Humber Upper transitional waterbody to the south of Howden. The monitored length is approximately 34.2 km and drains a catchment area of approximately 87.8 km^2.	Diffuse source pollution from contaminated bed sediments and poor nutrient management; point source pollution from continuous sewage discharge; and physical modifications.

Relation to Scheme: The River Ouse is crossed by the Grid Connection Corridor to the west of Barmby Barrage (**Figure 1-2, ES Volume 3**). Several tributaries of the waterbody that lie within the catchment are also crossed by the Grid Connection Corridor in the area north of Drax village.

Site observations: Through the Study Area the River Ouse exhibits a passive meandering typology and is set within a wide open valley. Embankments of approximately 1 m height are present on both sides of the river, set back approximately 4 m from the bank tops, disconnecting the river from the floodplain. Drainage channels are common across the floodplain. Adjacent land use is predominantly agricultural, although the riparian zone comprises a strip of grassland and includes the embankments. Bed substrate could not be observed during survey due to high turbidity, however it is assumed to be dominated by fine material due to the low energy and tidal nature of the river through this reach. The river has been historically modified for navigation with numerous canals and docks connected via locks altering the natural flow regime. Historic modifications have left the river largely devoid of morphological diversity. The river is tidal through the Study Area upstream to Naburn and is navigable throughout its length.

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
Derwent from Elvington Beck to River Ouse (GB104027068311)	Moderate (2019)	Fail (2019) Does not require assessment (2022)	Good (2027)	Heavily modified	The reportable reach extends from Sutton Upon Derwent and flows in a generally southerly direction to the confluence with the River Ouse at Barmby on the Marsh. The reportable length is approximately 24 km, and drains a catchment area of approximately 64.3 km^2.	Physical modifications.

Relation to Scheme: The River Derwent is crossed by the Grid Connection Corridor south of Wressle (**Figure 1-2, ES Volume 3**). Several tributaries that lie within the catchment are also crossed by the Grid Connection Corridor, while others are located within the Solar PV Site.

Site Observations: The River Derwent is within a similar setting to the River Ouse through the Study Area, being surrounded by agricultural land in a wide open valley. Similarly, it also has embankments on both sides of the river disconnecting it from the floodplain. Flow on the river is controlled by the Barmby Tidal Barrage located at the confluence with the River Ouse. The tidal barrage controls flow into the River Ouse from the River Derwent, and also prevents the tidal water of the River Ouse from entering the River Derwent. Bed substrate could not be observed during survey but was assumed to comprise fine material due to the low energy nature of the river and impounding Barmby Tidal Barrage. The river was largely devoid of morphological diversity, although some berms were present on the right bank providing some local flow variation and marginal habitat.

The watercourse includes national and international habitat designations. The River Derwent is a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI), and is within the Lower Derwent Valley Special Protection Area (SPA). The eastern border of the river at Wressle Clough forms the margin of both the Lower Derwent Valley Ramsar site and National Nature Reserve (NNR).

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
Fleet Dike catch (tributary of Ouse) (GB104027063630)	Moderate (2019)	Fail (2019) Does not require assessment (2022)	Good (2027)	Artificial	Fleet Dike rises to the south of Willitoft and flows in a generally westerly direction to its confluence with the River Derwent at Wressle Clough. The reportable length is approximately 5.2 km and drains a catchment area of approximately 13 km^2.	Diffuse source pollution from poor nutrient management, and point source pollution from private sewage treatment.
Relation to Scheme: Fleet Dike flows around the periphery of Solar PV Area 2a and would be crossed by the Interconnecting Cables. **Site Observations**: Fleet Dike was observed at the existing Street Lane (B1228) crossing at Brooklands and at the existing Willitoft Road crossing. At the Willitoft Road crossing, the watercourse comprised a straight, artificial or heavily modified channel. Flow was sluggish or not perceptible. The channel was over deep and had steep banks vegetated with short grasses. Occasional lone trees were present on the left bank. Bed substrate appeared to be silty, and turbidity was high indicating the presence of fine sediment. land use comprised agricultural fields which likely provide a considerable input of fine sediment. Algal growth was observed upstream of the crossing indicating an input of nutrients. The watercourse was of a similar character at the Street Lane crossing, although there was a greater cover of trees and scrub on the banks. The lower reaches of the watercourse include national and international habitat designations. It forms the southern border of the Lower Derwent Valley NNR, and is within the Lower Derwent Valley SAC and Ramsar site, and the Breighton Meadows SSSI.						
Foulness from Black Beck to Market Weighton	Poor (2022)	Fail (2019) Does not require	Good (2027)	Not designated artificial or heavily modified	This reportable reach includes the River Foulness from its source close to Everingham to	Diffuse source pollution from septic tanks and poor nutrient

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
Canal (GB104026066690)		assessment (2022)			its confluence with the Market Weighton Canal to the south near Hasholme Carr. The reportable reach also includes the Market Weighton Canal between Market Weighton and Hasholme Carr, and a tributary of the River Foulness which rises south of Melbourne, and meets the main stem of the river east of Foggathorpe. The reportable length is approximately 44.2 km and drains a catchment area of approximately 202 km^2.	management, and point source pollution from trade/industry discharge.

Relation to Scheme: The River Foulness is located to the east of Gribthorpe and forms the eastern boundary of Solar PV Area 1e and Ecology Mitigation Area 1h. Several unmonitored tributaries that lie within the catchment are located within the Solar PV Site.

Site Observations: The River Foulness was observed at the existing road crossing at Welham Bridge where it appeared to exhibit a passive meandering typology. Bed material could not be observed due to high turbidity but is assumed to mostly comprise finer sediment due to the low energy nature of the watercourse and adjacent agricultural land use. The banks were vegetated with taller herbs and grasses and scrub, with occasional trees.

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
Humber Upper (GB530402609203) – transitional waterbody	Moderate (2022)	Fail (2019) Does not require assessment (2022)	Good (2027)	Heavily modified	This reportable reach extends from immediately west of Boothferry Bridge to the confluence with the River Trent at Blacktoft Sands where it then becomes the Humber Lower. The reportable reach includes a significant extent of the River Trent and has a surface area of 12.5 km^2.	Diffuse source pollution from poor nutrient management; point source pollution from continuous sewage discharge; physical modifications; and surface water abstractions.
Relation to Scheme: The waterbody is not within 1 km of the Scheme, but there is hydrological connectivity to it via several unnamed watercourses, some of which are within the Solar PV Site at Areas 3b and 3c. Given that the watercourse is over 1 km from the Scheme and would not be directly impacted, it was not visited during the Site walkover. The river here includes national and international designations, namely the Humber Estuary SAC, Ramsar site and SSSI.						
Birk Lane Drain Catchment (tributary of Derwent) (GB104027063430)	Bad (2022)	Fail (2019) Does not require assessment (2022)	Good (2027)	Not designated artificial or heavily modified	This watercourse rises as Autherthaws Drain close to Autherthaws Farm, and flows south-west to its confluence with the River Derwent at Bubwith. The watercourse is 3.9 km long and has a catchment of 15.9 km^2.	Diffuse source pollution from septic tanks and poor nutrient management; point source pollution from private sewage treatment; physical modifications due to land drainage and barriers; and flow

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
						issues due to land drainage.
Relation to Scheme: The waterbody is not within 1 km of the Scheme, but there is hydrological connectivity to it via several unnamed watercourses, some of which are within the Solar PV Site at Solar PV Area 1a. Given that the watercourse is over 1 km from the Scheme and would not be directly impacted, it was not visited during the site walkover.						
Aire from Fryston Beck to River Ouse Water Body (GB104027063037)	Moderate (2022)	Fail (2019) Does not require assessment (2022)	Good (2027)	Heavily modified	This reach of the River Aire is designated from Knottingley, and extends in a generally easterly direction to meet the River Ouse at Asselby Island (downstream of the Scheme). It has a length of 48.9 km and catchment area of 92.2 km^2.	Not applicable – watercourse only designated at Cycle 3, and so no previous investigations yet reported on Catchment Data Explorer (Ref. 9-47).
Relation to Scheme: The waterbody is not within 1 km of the Scheme, but its wider catchment intersects the southern extent of the Scheme at Drax Power Station. There is potential for hydrological connectivity to it via drains in the Study Area. Given that the watercourse is over 1 km from the Scheme and would not be directly impacted, it was not visited during the site walkover.						
Barmby Water Body (GB30430722) – lake / reservoir	Good (2019)	Fail (2019)	Good (2015)	Artificial	This waterbody is a reservoir located north-east of Barmby on the Marsh at NGR SE7035929351. It has an altitude of 2 m, a catchment area of	Not applicable – already at Good Status

Waterbody	Ecological Status/Potential	Chemical Status	Objective	Hydromorphological Designation	Reportable Reach	Reasons for Not Achieving Good Status
					20.75 ha, a surface area of 0.107 km^2 and mean depth of 8.2 m.	

Relation to Scheme: The reservoir is located adjacent to the River Derwent northeast of Barmby on the Marsh. It is within 1 km of the Grid Connection Corridor, but is on the opposite side of the River Derwent to the proposed works for the Grid Connection Corridor. As the waterbody is isolated from any construction works and not online to any watercourse that might be affected by the works, it is scoped out of further assessment.

Table 9-7. Named watercourses in the Study Area (refer to Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3] for locations)

Waterbody	Relevant WFD Catchment	Watercourse description
Carr Dike	Ouse from River Wharfe to Upper Humber	Flows west from Common Drain for 3 km, passing through the Drax Power Station site, to Lendall Drain (not crossed by the adjacent Grid Connection Corridor and is outside of the Order limits).
Lendall Drain	Ouse from River Wharfe to Upper Humber	Flows south to north from Carr Dike 570 m to the River Ouse to the north of Drax Power Station (not crossed by the adjacent Grid Connection Corridor and is outside of the Order limits).
Clough Drain	Derwent from Elvington Beck to River Ouse	Flows for a distance of 1 km to the south of Barmby Reservoir to the River Derwent in a south-east to north-west direction (not crossed by the adjacent Grid Connection Corridor and is outside of the Order limits)
Old Derwent (drain)	Derwent from Elvington Beck to River Ouse	Flows for a distance of 1.7 km in a south-east to north-west direction to the north of Barmby Reservoir, to meet the River Derwent (not crossed by the adjacent Grid Connection Corridor and is outside of the Order limits).

Waterbody	Relevant WFD Catchment	Watercourse description
New drain 1	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 2.4 km from the A63 south of Newsholme to the River Derwent, in a south-east to north-west direction (not crossed by Grid Connection Corridor and is outside of the Order limits).
Black Dyke	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 2 km from Rowlandhall Lane in a north-west to south-east direction to New Drain and would be crossed twice by the Site Accesses to the west of Solar PV Area 3c.
Duck Swang Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.6 km north to south from close to Howden Station (east of Solar PV Area 3c) connecting to Marsh Drain adjacent to the B1230 at Howden. It does not intersect the Order limits.
Yarmshaw Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.5 km in a north to south direction from Black Dyke, and then west to east to join Howden Drain. It does not intersect the Order limits and is located at the southern extent of the Study Area south of Newsholme Parks.
Near Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 9.2 km initially east from North Howden (south of Solar PV Area 2g), before reverting south and west towards the River Ouse near Skelton. It does not intersect the Order limits.
Commonend Drain / Featherbed Drain	Foulness from Black Beck to Market Weighton Canal	Rises close to Newsholme Farm and flow initially south between Solar PV Areas 2d and 2e. Close to Spaldington Grange it then flows east to the River Foulness alongside Bishopsoil Drain between Solar PV Areas 2f and 2g. It has a total length of 7.4 km and will by crossed by the Interconnecting Cables using a trenchless approach between Solar PV Area 2f and 2g.
Bishopsoil Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 4.7 km through Solar PV Area 2g in a south-west to north-east direction to the River Foulness alongside Commonend Drain. It would be crossed by the Interconnecting Cables and an access track within Solar PV Area 2g.

Waterbody	Relevant WFD Catchment	Watercourse description
Great Committee Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 6.3 km from Solar PV Area 2b, in a southerly direction along the eastern edge of Area 2d, and then in a north-east direction on through Area 2e (partially in culvert) and continuing south of Solar PV Areas 1e and 1f to the River Foulness.
Londesborough Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 2.5 km through Solar PV Area 1e in a south-west to north-east direction to the River Foulness. It would be crossed by an access track using an existing culvert (which may require extension) within Solar PV Area 1e.
Park Sewer (Drain)	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.6 km north to south immediately south of Spaldington, and to the east of Solar PV Area 2e. It does not intersect the Order limits.
East Goit Sewer (Drain)	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.9 km north to south from the southwestern corner of Solar PV Area 1f to Commonend Drain. It does not intersect the Order limits.
Hall Dyke	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.7 km north to south through Solar PV Area 2e to New Drain at the boundary of Area 2f. It would be crossed for the Interconnecting Cables and for an access track (using an existing culvert that may require extending) within Solar PV Area 2e.
New Drain 2	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 0.8 km north to south along the boundary of Solar PV Area 2f from Hall Dyke to Commonend Drain. It would be crossed by the Interconnecting Cables.
Seller Dike	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 2.5 km in a south-easterly direction along the boundary of the Ecology Mitigation Area from the grounds of Foggathorpe House to the River Foulness. It does not intercept the Order limits.
Sewer Dike	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.8 km west to east along the boundary of Solar PV Area 1a, 1b to meet Seller Dike at the northern boundary of the Ecology Mitigation Area.

Waterbody	Relevant WFD Catchment	Watercourse description
Sewer Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 1.4 km west to east from Solar PV Area 1a through 1b to Sewer Dike. It would be crossed for an access track between Solar PV Area 1a and 1b.
Hazelbush Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 2.6 km in a south-easterly direction from Westfield Lane at Harlthorpe to Seller Dike at the northern extent of the Study Area. It does not intercept the Order limits.
Farfield Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 0.7 km in an easterly direction to Hazelbrush Drain at Harlthorpe. The drain does not intercept the Order limits and is at the northern extent of the Study Area.
Bubwith and Harlthorpe Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 3.7 km west to east from close to Highfield at the north-western extent of the Study Area, along the northern boundary of Solar PV Area 1a to Seller Dike. It would not be crossed by the Scheme.
Ings Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 1 km north to south from Harlthorpe Green to the Bubwith and Harlthorpe Drain at the northern boundary of Solar PV Area 1a.
Clay Bowdales Drain	Foulness from Black Beck to Market Weighton Canal	Flows for a distance of 0.8 km west to east across Willitoft Road to Burtles and Highfield Drain at the southern site boundary of Solar PV Area 1a. It would be crossed by the Scheme within Solar PV Area 1a by a new clear span bridge for internal roads and the Interconnecting Cables.
Highfield Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 0.5 km south to north to Bubwith and Harlthorpe Drain along the western boundary of Solar PV Area 1a in the direction of Birk Lane Drain.
Lings and Windman Hills Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 0.3 km west to east to Highfield Drain along the north-western boundary of Solar PV Area 1a. It lies within the Order limits, but would not be crossed by the Scheme.

Waterbody	Relevant WFD Catchment	Watercourse description
Burtles and Highfield Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 1.1 km in a northerly direction from Bubwith through Solar PV Area 1a to meet the Bubwith and Harlthorpe Drain and New Moorlands Drain at the northern extent of Solar PV Area 1c. It would be crossed by Onsite electrical cabling and an access track within Solar PV Area 1a.
New Moorlands Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 0.8 km north to south from the A163 west of Harlthorpe to the Bubwith and Harlthorpe Drain at the northern boundary of Solar PV Area 1a. It does not intersect the Order limits.
Old Moors Drain	Foulness from Black Beck to Market Weighton Canal	Flows for 0.8 km north to south between Birks Lane Drain Catchment WFD waterbody to New Moorlands Drain at the northern extent of the study area, west of Harlthorpe. It does not intersect the Order limits.
Cote Garthlands Drain	Foulness from Black Beck to Market Weighton Canal	Flows 0.5 km south-west to north-east to Bubwith and Harlthorpe Drain from Bubwith (northwest of Solar PV Area 1a). It does not cross into the Order limits.
Four Soles Drain	Derwent from Elvington Beck to River Ouse	Flows 0.6 km north to south to Crossbutts Drain from Bubwith (west of Solar PV Area 1a). It does not cross into the Order limits.
Southwood Drain	Derwent from Elvington Beck to River Ouse	Flows 1.8 km east from Blackwood Hall Farms west to the River Derwent at Bubwith (west of Solar PV Area 1a). It does not cross into the Order limits.
Crossbutts Drain	Derwent from Elvington Beck to River Ouse	Flows 0.6 km east to west to Southwood Drain, to the southeast of Bubwith (west of Solar PV Area 1a). It does not cross into the Order limits.
Lings Drain	Derwent from Elvington Beck to River Ouse	Flows 0.6 km east to west to Southwood Drain from the B1228, parallel to Crossbutts Drain, southeast of Bubwith (west of Solar PV Area 1a). It does not cross into the Order limits.

Waterbody	Relevant WFD Catchment	Watercourse description
West Bottoms South Drain	Derwent from Elvington Beck to River Ouse	Flows 0.4 km east to west to Southwood Drain, east of Bubwith (west of Solar PV Area 1a). It does not cross into the Order limits.
Foss Dike	Foulness from Black Beck to Market Weighton Canal	Flows 4.8 km north to south to River Foulness, to the east of Foggathorpe and northeast of the Ecology Mitigation Area. It does not cross into the Order limits.
Fleet Dike	Derwent from Elvington Beck to River Ouse	Flows 3.5 km east to west to River Derwent. The drain flows along the southern boundary of the Solar PV Area 2a from the drain FL05 within the Grid Connection Corridor. This was discussed further in Table 9-6 as it is WFD designated as the 'Fleet Dike catch (tributary of Ouse)' waterbody.
Barmby Ferry Drain	Ouse from R Wharfe to Upper Humber	Flows for 0.5 km northeast to southwest from Between Dikes Road (to the north of the River Ouse) to the River Ouse ,to the west of the Grid Connection Corridor It does not cross into the Order limits.
Bishops Meadow Drain	Ouse from R Wharfe to Upper Humber	Flow from 3.2 km generally west to east from Between Dikes Road to Bishop Meadows to the south of Babthorpe (and to the north of the Grid Connection Corridor). It does not cross into the Order limits.
Babthorpe Farm Drain	Derwent from Elvington Beck to River Ouse	Flows for 3.1 km generally north to south from West End Farm, and through The Haggs and Babthorpe to meet Bishops Meadow Drain (to the north of the Grid Connection Corridor). It does not cross into the Order limits.
Loftsome Bridge Drain	Derwent from Elvington Beck to River Ouse	Flows generally west to east for 1.6 km, mainly adjacent to the A63, by which it is crossed for a section, through Brackenholme and the grounds of Hagthorpe Hall to the River Derwent. The drain would be crossed by the Scheme using a trenchless approach.
Hagthorpe Ings Drain	Derwent from Elvington Beck to River Ouse	Flows west to east for 1.0 km between Woodhall Lane and the River Derwent, to then north of Hagthorpe Hall and the Grid Connection Corridor. It does not cross into the Order limits.

Waterbody	Relevant WFD Catchment	Watercourse description
Hagthorpe Clough	Derwent from Elvington Beck to River Ouse	Flows north to south broadly parallel to the River Derwent to the north of Hagthorpe.
Inholms Drain	Ouse from R Wharfe to Upper Humber	Flows 0.8 km north to south to drain FO 08 at the south-eastern extent of the study area at Portington. It does not cross into the Order limits.

9.5.19 The Scheme is located across three IDB areas. The Solar PV Site is within the area of the Ouse and Humber Drainage Board, and the Grid Connection Corridor is within the area of the Ouse and Humber Drainage Board, Ouse and Derwent IDB and the Selby Area IDB. The respective areas are indicated within **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**. Engagement has been undertaken with the IDBs (see section 9.3) during development of the DCO Application.

Hydrology

9.5.20 There are no National River Flow Archive (NRFA) monitoring sites within the Study Area (Ref. 9-50). However, there are upstream gauging stations for the River Ouse, River Derwent and River Foulness on the Hydrology Data Explorer (Ref. 9-64).

9.5.21 The nearest monitoring point for the River Ouse is at Skelton (Station 27009, approximate NGR SE 56845 55373) (Ref. 9-64), over 90 km upstream of the Order limits. This monitoring location shows a mean daily flow of 52.13 m^3/sec and Q95[5] flow of 7.81 m^3/sec. Whilst this gauging station is located a long way upstream, it demonstrates the size and scale of the River Ouse. Within the Study Area the river is tidal. The National Tidal Limit (NTL) for the River Ouse is 14 miles upstream from the confluence with the River Derwent at Naburn Lock. The river is navigable throughout its length.

9.5.22 The nearest gauging point for the River Derwent is at Buttercrambe (Station 27041, approximate NGR SE 73112 58712) (Ref. 9-65), approximately 22 km from the northern boundary of the Order limits and shows a mean daily flow of 16.989 m^3/sec and Q95 flow of 4.41 m^3/sec. In the Study Area, both the mean flow, and the Q95 will be considerably larger than that recorded at Buttercrambe.

9.5.23 While the River Derwent in the Study Area would naturally be tidal, water from the tidal River Ouse is prevented from entering the River Derwent by the Barmby Barrage. This was built in the 1970s as water is abstracted at Loftsome Bridge Wastewater Treatment Works (WwTW). The barrage prevents water from the Ouse reaching the Derwent, maintains a depth of water for navigation and abstraction, and keeps the river at a low enough level to allow drainage from surrounding land.

9.5.24 For the River Foulness, the nearest monitoring point is at Holme House Farm (Station 26012, approximate NGR SE 77976 37277) (Ref. 9-66). This is approximately 1.25 km from the northern boundary of the Ecology Mitigation Area. This monitoring point shows a mean daily flow of 1.2 m^3/sec and Q95 flow of 0.041 m^3/sec.

Surface Water Quality

9.5.25 The nearest baseline water quality data for the study area has been obtained from the Environment Agency's Water Quality Archive website (Ref. 9-54). The nearest water quality monitoring stations are located at the River Ouse (at Long Drax, NGR SE 68555 27763), Fleet Dike (at Wressle Clough, NGR SE 70552 32746), River Derwent (at Loftsome Bridge, NGR SE 70572 30100) and River Foulness (at Ford Fb, NGR SE 83695 32670). These locations are shown in **Figure 9-1, ES Volume 3 [EN010143/APP/6.3]** and data is summarised in **Table 9-8** and **Table 9-9.**

9.5.26 **Table 9-8** indicates that the River Ouse at Long Drax (latest data recorded in 2021) is circum-neutral[6] with an average pH of 7.91 and falls within the WFD high classification (based upon 20 previous samples taken at the Long Drax site). At this location the river is well oxygenated and has moderate electrical conductivity. Ammonia and orthophosphate levels are elevated but meet the WFD Environmental Quality Standards (EQS) for Good status (Ref. 9-15). Nitrate (3.65 mg/l) is also slightly elevated. There is therefore evidence of some organic pollution which is not surprising since the river is surrounded by agricultural land and receives sewage discharges.

9.5.27 **Table 9-8** indicates the water quality of Fleet Dike (at Wressle Clough) is also slightly alkaline with an average pH of 7.57. The watercourse has moderate electrical conductivity and is failing to meet the WFD good EQS for dissolved oxygen. The watercourse appears to be significantly impacted by the surrounding agricultural land use given an elevated mean nitrate content of 10 mg/l and high orthophosphate (mean 0.25 mg/l) which surpasses the WFD EQS threshold for Good status. Nitrate and orthophosphate are likely to be indicative of fertiliser runoff into this watercourse (and others across the area) where there is less dilution potential than in the River Derwent or River Ouse. Ammonia is also above WFD EQS and is probably related to sewage. Indeed, point source pollution from private sewage treatment is a known reason for this watercourse not achieving Good Ecological Potential (see **Table 9-6**).

9.5.28 **Table 9-9** indicates that the water quality of the River Derwent is slightly alkaline with an average pH of 8.02. It has a moderate electrical conductivity and is well oxygenated. Orthophosphate is lower (mean 0.04 mg/l) based on these 20 samples than recorded at Fleet Dike and the River Ouse and is within the WFD Good EQS. However, nitrate is still somewhat elevated and again indicates the agricultural pressure from surrounding land use. Ammonia is low in concentration and meets the Good WFD EQS. Dissolved copper and zinc are relatively low in concentration in this watercourse. Copper is above the WFD EQS for ‘pass’ (1 µg/l) but the EQS is for bioavailable copper and at 1.42 µg/l it is likely that the bioavailable concentration is within the EQS (but cannot be confirmed based on available data).

9.5.29 **Table 9-9** indicates that River Foulness is circum-neutral with an average pH of 7.66, also falling within the WFD high classification based on these 20 samples. Electrical conductivity is higher than the other watercourses described above, with an average of 999 µS/cm. Dissolved oxygen (10th percentile of 56.3% saturation) also fails to meet the WFD EQS for Good Status. Ammonia and orthophosphate meet the WFD EQS for Good status based on these samples. However, nitrate (as N) is again somewhat elevated (7.68 mg/l), suggesting agricultural inputs.

[6] Nearly neutral – in the range of pH 6.5 to 7.5

Table 9-8. Summary Environment Agency water quality monitoring data (2018–2022 – 20 samples)

			River Ouse					Fleet Dike				
Determinant	Units	WFD good standard	Mean	Max	Min	90th %tile	10th %tile	Mean	Max	Min	90th %tile	10th %tile
pH	pH Units	6–9	7.91	8.27	7.64	8.14	7.76	7.57	8.01	7.16	7.85	7.25
Temperature of Water	°C	28	11.5	22.5	4.9	17.9	5.1	11.5	18.7	4.9	18.0	6.4
Conductivity at 25°C	µs/cm		493	789	225	689	323	710	1061	378	948	502
Ammoniacal Nitrogen as N	mg/l	0.6 (90th %ile)	0.06	0.14	0.03	0.12	0.03	0.27	0.93	0.03	0.74	0.06
Nitrogen, Total Oxidised as N	mg/l		3.67	6.40	1.90	5.70	2.05	10.15	28.00	0.20	20.70	2.40
Nitrate as N	mg/l		3.65	6.39	1.89	5.67	2.04	10.03	27.40	0.20	20.69	2.30
Nitrite as N	mg/l		0.020	0.040	0.007	0.034	0.009	0.114	0.640	0.004	0.293	0.028
Alkalinity to pH 4.5 as CaCO3	mg/l		124	190	75	165	82	193	300	81	264	117
Orthophosphate, reactive as P	mg/l	0.08	0.17	0.33	0.03	0.28	0.05	0.25	1.60	0.04	0.38	0.08
Oxygen, Dissolved, % Saturation	%	60 (10th %ile)	83.4	100.0	61.9	98.0	63.7	70.4	121.2	21.8	101.8	44.1
Oxygen, Dissolved as O2	mg/l		9.43	12.70	5.95	11.80	6.06	7.79	12.70	2.05	11.05	4.35
Copper, Dissolved	µg/l	1 (bioavailable)	2.70	3.70	1.30	3.52	1.71	-	-	-	-	-
Zinc, Dissolved	µg/l	10.9 (bioavailable)	6.58	10.40	4.10	9.26	4.43	-	-	-	-	-

Table 9-9. Summary Environment Agency water quality monitoring data (2018–2022 – 20 samples)

			River Derwent					River Foulness				
Determinant	**Units**	**WFD good standard**	**Average**	**Max**	**Min**	**90th %tile**	**10th %tile**	**Average**	**Max**	**Min**	**90th %tile**	**10th %tile**
pH	pH Units	6–9	8.02	8.31	7.69	8.23	7.70	7.66	8.29	7.39	7.76	7.42
Temperature of Water	°C	28	9.8	17.8	4.0	17.1	5.5	10.7	20.6	4.4	18.1	6.4
Conductivity at 25°C	µs/cm		533	649	227	633	356	999	1321	527	1318	752
Ammoniacal Nitrogen as N	mg/l	0.6 (90th %ile)	0.04	0.08	0.03	0.07	0.03	0.26	0.48	0.06	0.48	0.06
Nitrogen, Total Oxidised as N	mg/l		4.74	6.10	2.40	5.80	3.74	7.79	17.00	0.48	10.00	2.84
Nitrate as N	mg/l		4.72	6.08	2.39	5.77	3.72	7.68	16.90	0.36	9.80	2.77
Nitrite as N	mg/l		0.024	0.035	0.009	0.033	0.013	0.113	0.200	0.051	0.180	0.064
Alkalinity to pH 4.5 as CaCO3	mg/l		150	200	87	195	106	214	240	133	240	180
Orthophosphate, reactive as P	mg/l	0.08	0.04	0.09	0.02	0.06	0.03	0.04	0.14	0.01	0.12	0.01
Oxygen, Dissolved, % Saturation	%		94.0	111.4	72.7	102.4	83.5	81.0	158.5	51.7	96.4	56.3
Oxygen, Dissolved as O2	mg/l	60 (10th %ile)	10.71	12.60	8.47	12.21	8.80	9.01	16.10	5.77	10.50	6.44

		River Derwent						River Foulness				
Determinant	**Units**	**WFD good standard**	**Average**	**Max**	**Min**	**90th %tile**	**10th %tile**	**Average**	**Max**	**Min**	**90th %tile**	**10th %tile**
Copper, Dissolved	µg/l	1 (bioavailable)	1.42	2.90	0.60	2.44	0.76	-	-	-	-	-
Zinc, Dissolved	µg/l	10.9 (bioavailable)	1.90	3.40	0.97	2.66	1.16	-	-	-	-	-

Aquatic Ecology

9.5.30 An **Aquatic Ecology Baseline Report (Appendix 8-4, ES Volume 2 [EN10143/APP/6.2]**) has been compiled for the Scheme. This provides an overview of any protected, notable or invasive species of aquatic macroinvertebrates, macrophytes and fish within the Study Area based on desk study and site survey. A summary is provided below but refer to **Appendix 8-4, ES Volume 2 [EN10143/APP/6.2]** for full details.

9.5.31 The aquatic ecology desk study indicates that the Humber Estuary is a nationally important for river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* these are both present as a qualifying feature in the Humber Estuary SAC designation. They are both included in the Selby BAP (Ref. 9-67). Habitats Directive Annex II and V species Allis shad *Alosa alosa* is also listed under the Selby BAP (Ref. 9-67), as being present in the River Ouse. The species is primarily marine yet migrates into freshwater to spawn. European eel *Anguilla Anguilla* has been identified within 2km of the Aquatic Ecology Study Area.

9.5.32 Annex II species European bullhead *Cottus gobio* has been recorded within the River Foulness within 2 km of the Aquatic Ecology Study Area.

9.5.33 Notable macroinvertebrate species were identified in surveys as described in the **Aquatic Ecology Baseline Report (Appendix 8-4, ES Volume 2 [EN10143/APP/6.2]**) in watercourse DE53 (the leech *Dina lineata*) and FL19 (the beetle *Agabus melanarius*). Additionally, there are notable macroinvertebrates included in the Selby BAP (Ref. 9-67), which may be present in the Study Area. These include *Acilius canaliculatus*, *Agabus labiatus*, *Helophorus strigifrons* and *Dryops auriculatus*. The rare Depressed River mussel *Pseudanodonta complanate* (a UK BAP species) is also listed in the BAP yet is more likely to be present upstream of the Study Area between Low Hutton and Barmby Tidal Barrage on the River Ouse.

9.5.34 White-clawed crayfish may be present within the Study Area, as they are listed in the citation of the River Derwent SAC. However, there are no records of the species within 2 km of the Order limits within the last ten years, nor within 10 km of the Study Area. There are no records of the white-clawed crayfish in Selby BAP (Ref. 9-67) records. There are more recent records of American signal crayfish *Pacifastacus leniusculus* in the area (in 2017 at River Wharfe and grid reference SE524405), which being an invasive species, reduces the likelihood of native white-clawed being present. The likelihood of white-clawed crayfish presence within the Study Area is therefore considered negligible (see **Aquatic Ecology Baseline Report (Appendix 8-4, ES Volume 2 [EN10143/APP/6.2])**.

9.5.35 Several macrophyte species are included in the Selby BAP (Ref. 9-67). These include the nationally scarce tasteless water pepper *Persicaria mitis*, pillwort *Pilularia globulifera* and greater water-parsnip *Sium latifolium* (the former two listed under the Schedule 9 of the Wildlife and Countryside Act 1981). These species may be present within 2 km of the Study Area. The only notable macrophyte species identified in the desk study as specific records is the protected tubular water-dropwort *Oenanthe fistulosa*. The water-dropwort is listed as a UK BAP Priority species and on the national species Red list.

9.5.36 Macrophyte surveys indicated that assemblages were of limited diversity with high percentage cover most likely from the high nutrient content from the surrounding agricultural land use. Terrestrial encroachment was present across some of the watercourses, signifying prolonged periods of drying. Macrophyte assemblages were unclassifiable for WFD indices at most watercourses, except for Black Dyke and FL19 which was designated as High Status, however this was considered unlikely to be representative of the watercourses more generally.

9.5.37 The macrophyte surveys identified the Invasive Non-Native Species (INNS) species Nuttall's waterweed *Elodea nuttallii* within the Study Area, which is listed under the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref. 9-91). The legislation referenced makes it an offence to plant, or otherwise cause to grow (including allowing to spread), listed plant species in the wild. If transported off site, there is a duty of care with regards to the disposal of any part of the plant that may facilitate establishment in the wild and cause environmental harm (as per the Environmental Protection Act 1990) (Ref. 9-4). The legislation also makes it an offence to release, or allow to escape, listed species (or species not ordinarily resident in and is not a regular visitor to Great Britain in a wild state) into the wild.

9.5.38 Several other INNS were identified in the desk study. 167 records of the highly invasive demon shrimp *Dikerogammarus haemobaphes* were noted within the last ten years. Species identified on the Wildlife and Countryside Act 1981 (Schedule 9) include Himalayan balsam *Impatiens glandulifera* and Nuttall's waterweed. Amphipod *Gammarus tigrinus* was also identified. There are statutory constraints regarding their potential spread, and therefore mitigation will be required during construction to prevent their spread and where practicable locally eradicate these species within the construction boundary. The non-native but non-invasive shrimp *Crangonyx pseudogracilis/floridanus* and the New Zealand mud snail *Potamopyrgus antipodarum* were also recorded, and though these species are not listed in UK legislation, bio-security measures to prevent their spread should still be considered during the Scheme construction.

Solar PV Site

9.5.39 This section of the baseline area includes the Study Area around the Solar PV Areas, Interconnecting Cable Corridor, Ecology Mitigation Area and associated Site Accesses (where they are within 1 km of the aforementioned areas).

Geology, Groundwater and Soils

9.5.40 The Solar PV Site is primarily underlain by two bedrock geologies (Ref. 9-48) which include:

a. Mercia Mudstone Group – comprising mudstone, which covers the majority of the sites; and

b. Sherwood Sandstone Group – comprising sandstone, which covers the Solar PV Areas 2a, 3a, 3b and 3c.

9.5.41 The bedrock underlying the Solar PV Site is largely overlain by clay superficial deposits including:

a. Hemingbrough Glaciolacustrine Formation – comprising clay, silt, situated to the east and south of the Solar PV Site; and

b. Thorganby Clay Member – comprising clay, silt covering the majority of the site.

9.5.42 There are also pockets of Breighton Sand Formation – comprising slightly clayey sand to silty sand across the site overlying the clay formations.

9.5.43 The Mercia Mudstone Group is classified as a Secondary B aquifer. 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.

9.5.44 The Sherwood Sandstone is classified as a Principal Aquifer. These aquifers tend to have high levels of water storage and high intergranular and/or fracture flow. They may provide important support to baseflow and water supply.

9.5.45 The Breighton Sand Formation is classified as a Secondary (undifferentiated) aquifer. These aquifers tend to have been previously designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

9.5.46 The Hemingbrough Glaciolacustrine Formation and the Thorganby Clay Formation are noted as unproductive.

9.5.47 There are a number of borehole scans available online on the BGS Geoindex website (Ref. 9-48) across the Study Area which include groundwater level information. The boreholes are described in **Table 9-10.**

Table 9-10. Groundwater level information from BGS GeoIndex – Solar PV Site

Reference	Location	Easting	Northing	Depth	Aquifer	Water Struck (mbgl)	Rest Water level (mbgl)
SE73/20	Oak Tree Farm Spaldington	476920	433000	60	Mercia Mudstone Group	40	
SE73/23	Lonthorp (Kilpin) LTD	476898	430536	42	Mercia Mudstone Group	34.7	7
SE73/1	Howden Airfield Spaldington	474690	432930	84.7	Sherwood Sandstone Group		3.2
SE73/13	Breighton Airfield	472660	435340	76.2	Sherwood Sandstone Group		4.26

Reference	Location	Easting	Northing	Depth	Aquifer	Water Struck (mbgl)	Rest Water level (mbgl)
SE73/16	Breighton Airfield	472340	435520	43	Sherwood Sandstone Group		6.35
SE73/25	Boothferry Golf Club Spaldingt on Lane	475700	432160	45	Sherwood Sandstone Group	32.5	5.54
SE73/26	Brecks Breighton Airfield	472643	435300	65	Sherwood Sandstone Group		5.6
SE73SE16	Mount Pleasant Spaldingt on	475640	432140	50	Sherwood Sandstone Group		5.3
SE73NW13	Drax Norton 400KV 304	474444	436865	12.65	Superficial Deposits	3	0.6
SE73NW14	Drax Norton 400KV 309	473839	435292	9.3	Superficial Deposits	2.9	0.8

9.5.48 **Plate 9-2** displays hydrographs for groundwater level data received from the Environment Agency from the Sherwood Sandstone Aquifer. Monitoring locations are shown on **Figure 9-3, ES Volume 3 [EN010143/APP/6.3]. Plate 9-2** displays data from January 2017 until July 2022. Groundwater levels fluctuate approximately 1 m seasonally with highest groundwater levels in March and April. Regionally, the direction is likely to be towards the River Derwent and River Ouse to the west/south where it discharges.

9.5.49 This is consistent with the groundwater flow direction indicated from the Environment Agency data which are in a south-west direction. Although locally the groundwater flow directions can be influenced by groundwater abstraction points in the area (identified by their SPZs on MAGIC map, Ref. 9-49), and situated south of the Environment Agency monitoring points. The abstraction locations include; Hemingborough Drift (NGR SE 67339 31356); Knedlington Mod Top (NGR SE 73646 28434); Barmby Barrage (NGR SE 68222 28659); Knedlington Mod Bot (NGR SE 73646 28434); and Barmby Tworks TS (NGR SE 70396 29960).

9.5.50 **Plate 9-3** shows that groundwater levels fluctuate seasonally from approximately 1 m to 5 m. The observation borehole at Barmby Tworks Drift is situated within alluvium deposits. It is unclear which superficial units the observation boreholes at Drax Drift and Hemingborough Drift are monitoring.

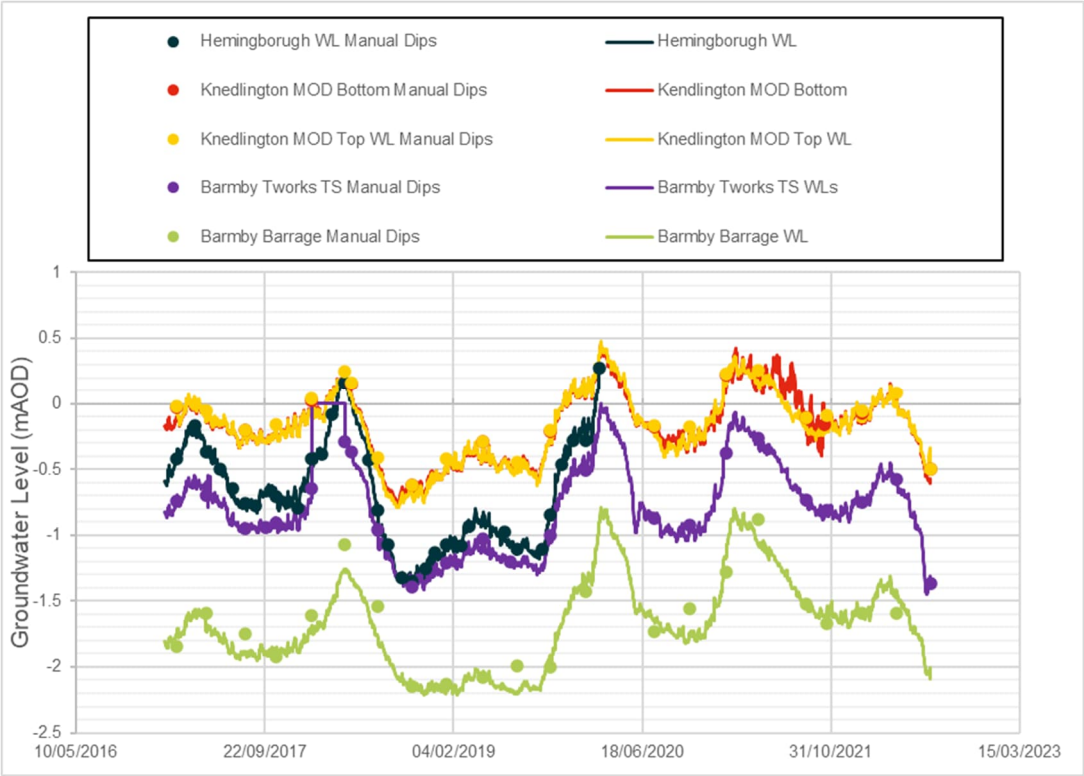

Plate 9-2. Observation boreholes in the Sherwood Sandstone

Source: data received from the freedom of information request to the Environment Agency, 2022

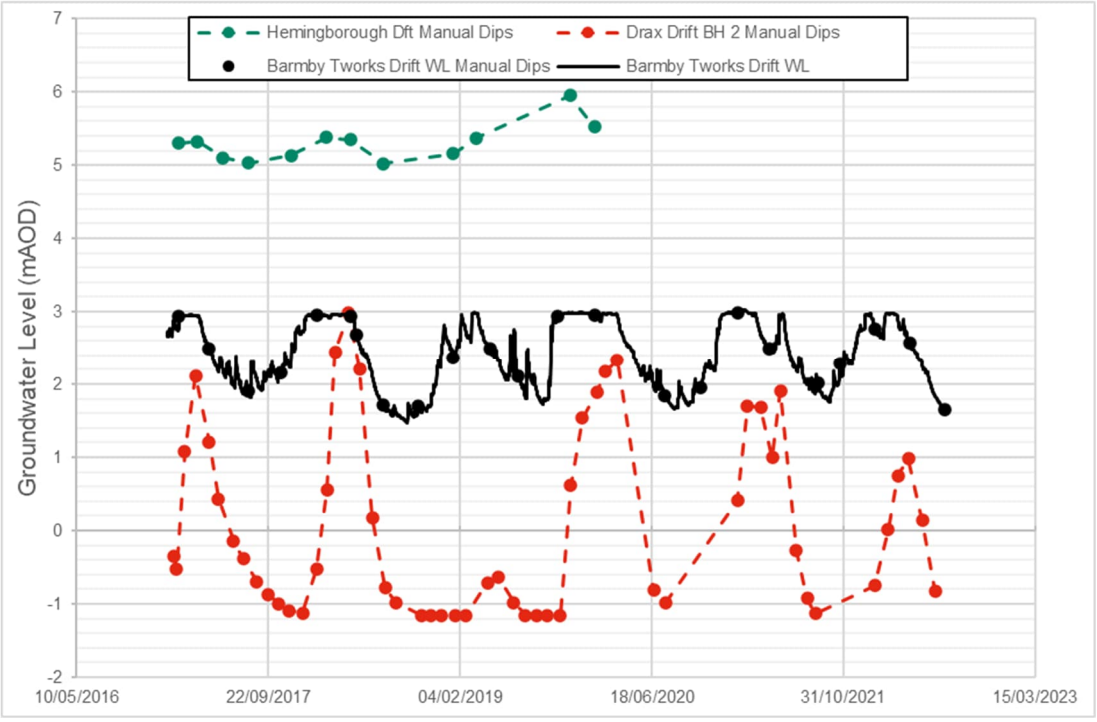

Plate 9-3. Observation boreholes in the superficial deposits

Source: data received from the freedom of information request to the Environment Agency, 2022

9.5.51 Although there is limited groundwater level data available across the Solar PV Site, it is considered likely that the groundwater in the Sherwood Sandstone Group aquifer and where present in the Mercia Mudstone group aquifer are confined by the overlying superficial clay deposits, particularly where these deposits are present in sufficient thickness. The Mercia Mudstone Group in the eastern part also confines the underlying strata.

9.5.52 According to the BGS borehole records the sand beds within superficial clay deposits may also hold groundwater. Depth to groundwater within these interbedded sand beds and the Breighton Sand Formation is expected to be shallow (less than 3 m below ground level).

9.5.53 The Study Area for the Solar PV Site is situated across two WFD groundwater body catchments (Ref. 9-47). The majority of the Solar PV Site fall within the East Riding Mercia Mudstone (GB40402G990200). The north to north-west of the site falls within the Derwent Sherwood Sandstone (GB40401G700600). These are shown in **Figure 9-3, ES Volume 3 [EN010143/APP/6.3].**

9.5.54 The East Riding Mercia Mudstone (GB40402G990200) covers a total area of 355.749 km^2 and under the WFD Cycle 3 classifications (2019), is classified as being at Poor Status, overall, quantitatively and chemically. The limiting elements on quantitative are the ‘quantitative dependent surface water body status’. Within the chemical classification, the limiting element is the ‘Chemical Groundwater Dependant Terrestrial Ecosystem (GWDTEs) test’, which is Poor, the other elements being Good. The water body has an objective of Poor by 2015, as it would be disproportionately expensive to achieve higher with an unfavourable balance of costs and benefits.

9.5.55 The Derwent Sherwood Sandstone (GB40401G700600) covers a total area of 184.74 km^2 and under 2019 Cycle 3 is at Poor Status overall, but has a Good Quantitative Status and Poor Chemical Status. The limiting element within the chemical status is the general chemical test being designated as Poor when the other parameters are all Good. The reasons for not achieving Good status and reasons for deterioration is listed as natural mineralisation, with no sector being responsible. The waterbody has an objective of ‘Good’ by 2021, which it has not yet achieved.

9.5.56 There are no Source Protection Zones (SPZ) situated within the Solar PV Site (Ref. 9-49). A small area SPZ I (Inner Protection Zone) is situated within the wider Study Area at Blackwood Hall Farms to the south of Bubwith (centred on NGR SE 72565 35320). There is also a small area of Zone I (Inner Protection Zone) and Zone II (Outer Protection Zone) adjacent to the Barmby Reservoir at the southern extent of the Solar PV Site Study Area. Zone 1 is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. It is based principally on biological decay criteria and is designed to protect against the transmission of toxic chemicals and water-borne disease. Zone 2 is defined by the 400-day travel time from a point below the water table.

9.5.57 The Soilscapes map viewer (Ref. 9-52) describes the soils beneath the Solar PV Site 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. The presence of loamy and clayey soils within the Solar PV Area has been confirmed through

soil survey as discussed in **Chapter 15: Soils and Agricultural Land, ES volume 1 [EN010143/APP/6.1]**.

Water Resources

Surface Water Abstractions

9.5.58 There are no surface water abstraction licenses within the Solar PV Site Study Area based on data obtained from the Environment Agency. However, there are two within a short distance downstream of the Study Area, abstracting from the River Derwent and Fleet Dyke to the west of the Solar PV Site as show in **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]**. Available details are as follows:

a. Licence 2/27/28/140 (A2 and A3) abstracts from Fleet Dike and River Derwent for spray irrigation with a maximum abstraction per location of 2736 m^3/d; and

b. Licence NE/027/0028/032 (A9) abstracts from River Derwent for spray irrigation with a maximum abstraction of 820 m^3/d.

Ground Water Abstractions

9.5.59 There are three ground water abstraction licenses within the Solar PV Site Study Area based on information obtained from the Environment Agency data. These are plotted in **Figure 9-3: Groundwater Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]** and available details are as follows:

a. Licence 2/26/34/152 (G1) to the south of Solar PV Area 1d abstracts from the Sherwood Sandstone for fish aquaculture with a maximum abstraction per borehole of 108 m^3/d;

b. Licence 2/27/28/079 (G7) to the north of Solar PV Area 2a at Breighton Airfield abstracts from the Sherwood Sandstone for process water with a maximum abstraction per borehole of 192 m^3/d; and

c. Licence NE/026/0034/021 (G11) between Solar PV Areas 2d and 2e abstracts from the Sherwood Sandstone for commercial washing and spray irrigation with a maximum abstraction per borehole of 55 m^3/d.

Private Water Supplies

9.5.60 There are two PWS located within the Solar PV Site Study Area, both of which are described as unused, although this has not been confirmed. These are both located to the south of Solar PV Area 1d and are included in **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]** as abstractions. Available details are as follows:

a. Willitoft Fish Farm (NGR SE 75125 34233) – unused (unconfirmed) – A23;

b. Mount Pleasant Farm (NGR SE 75176 33889) – unused (unconfirmed) – A24;

Consented Discharges

9.5.61 Information on consented discharges (Water Activity Permits) were obtained from the Environment Agency, and are presented in **Table 9-11** and plotted

in **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3].**

9.5.62 There are 24 Water Activity Permits within the Solar PV Site study area. Aside from one consent for trade effluent discharge to Southwood Drain, the remainder are related to sewage discharges, some of which are for water companies while others are private (non-water company) discharges. All discharges are to surface watercourses except for two that drain to soakways. None of these consented discharges are located within the Order limits.

Pollution incidents

9.5.63 Information on pollution incidents which have occurred in the last five years in the Study Area have been obtained from the Environment Agency. Pollution incidents to water are classified as Category 1 (serious impact) through to Category 4 (no impact). There was one Category 2 (significant) pollution incident that occurred on the Bubwith and Harlthorpe Drain at the northern extent of the Study Area (but not within the boundary of the Solar PV Site), see Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]. This incident was related to pollution by sewage. A further 12 lower category pollution incidents have been reported, but the locations of these have not been disclosed by the Environment Agency and so are not mapped on Figure 9-1 or tabulated here. The majority are related to pesticides or storm sewage spills.

Table 9-11. Consented discharges (Water Activity Permits) in the Solar PV Site Study Area

Fig 9-1 Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D6	NE/206/001	Intake Farm	Ditch (Tributary Of Fleet Dyke)	Sewage discharges - final/treated effluent - not water company
D11	NE/27/28/0249/001	Brooklands Caravan Park	Unnamed Tributary Of Fleet Dike	Sewage discharges - final/treated effluent - not water company
D17	NE/NPSWQD004682/001	The Brecks Company Limited	Southwood Drain	Trade discharges - cooling water
D21	NE/WA5745(DESC)/002	Boothferry Borough Council	Commonend Drain	Sewage discharges - final/treated effluent - not water company
D22	NE/509/001	The Bungalow	Tributary Of River Derwent	Sewage discharges - final/treated effluent - not water company
D23	NE/WADC283/001	Main Road Sps	West Linelands South Drain	Sewage discharges - pumping station - water company
D24	NE/108/001	Bubwith Housing Site	Dyon Drain To Derwent	Sewage discharges - final/treated effluent - not water company
D25	NE/1178/001	Ten Airey Houses	Intake Dr/Southwood Dr/Derwent	Sewage discharges - final/treated effluent - water company
D26	NE/149/001	New Sports Pavillion	Southwood Drain	Sewage discharges - final/treated effluent - not water company
D27	NE/WA5883/001	Artts,High Field Grange	Culverted Tributary.Of River Derwent	Sewage discharges - final/treated effluent - not water company

Fig 9-1 Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D28	NE/EPRNP3727XQ/001	Highfield Grange	Unnamed Trib Of Dyon Drain	Sewage discharges - final/treated effluent - not water company
D29	NE/WRA7582/001	Site Adjacent To Orchard Cottage	Park Sewer Drain	Sewage discharges - final/treated effluent - not water company
D33	NE/EPRHB3693RM/001	Rear Of 6 Ings Lane	Londesborough Drain	Sewage discharges - final/treated effluent - not water company
D35	NE/WRA6852/001	Proposed Dwelling Townend Farm	Land Drain (Tributary Of Great Committee Drain)	Sewage discharges - final/treated effluent - not water company
D43	NE/WRA7657/001	Properties At Four Beeches Farm	Tributary Of River Foulness	Sewage discharges - final/treated effluent - not water company
D49	NE/H166/001	Foggathorpe Sps	Moor Dike	Sewage discharges - sewer storm overflow - water company
D50	NE/H166/002	Foggathorpe Sps	Moor Dike Drain	Sewage discharges - pumping station - water company
D52	NE/H78/001	Foggathorpe Stw	Seller Dike	Sewage discharges - final/treated effluent - water company
D53	NE/H78/002	FOGGATHORPE STW	SELLER DIKE	Sewage discharges - final/treated effluent - water company
D54	NE/H78/003	Foggathorpe Stw	Seller Dike	Sewage discharges - final/treated effluent - water company
D55	NE/WRA8881/001	The Shippon, The Mistal & Old Byre	Groundwater Via Soakaway	Sewage discharges - final/treated effluent - not water company

Fig 9-1 Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D56	NE/WRA8881/002	The Shippon, The Mistal & Old Byre	Groundwater Via Soakaway	Sewage discharges - final/treated effluent - not water company
D57	NE/NPSWQD002773/001	Royal Oak	Carr Drain, A Trib Of Foulness	Sewage & trade combined - unspecified
D58	NE/771/001	Grove Farm	Ouse	Sewage discharges - final/treated effluent - not water company

Water Resources Designations

9.5.64 The western extent of the Solar PV Site (west of Gribthorpe) is contained within a Drinking Water Safeguard Zone for surface water (designation SWSGZ6008 Elvington and Loftsome Bridge – Humber). This includes all of Solar PV Areas 1d, 2a, 2c and 3a, and parts of Solar PV Areas 1a, 2b and 3b. It also covers the Interconnecting Cable Corridors to the west of Solar PV Areas 2a and 2c, and to the south and west of Solar PV Area 3a. It also includes Site Accesses west of Solar PV Area 2a and north of Solar PV area 2b. Drinking Water Safeguard Zones are established around public water supplies where additional pollution control measures are needed. Here water supplies are at risk from pesticides (metaldehyde, with carbetamide, propyzamide and quinmerac under consideration).

9.5.65 There is a Drinking Water Protected Area at the north-western extent of the Solar PV Site Study Area, to the north-west of Willitoft (Water body ID104027068311 – River Derwent from Elvington Beck to River Ouse) and this overlaps partially with Solar PV Area 1a. Drinking Water Protected Areas (Surface Water) are where raw water is abstracted from rivers and reservoirs for human consumption and additional measures are required to protect the raw water supply to reduce the need for additional purification treatment.

9.5.66 As shown on **Figure 9-1, ES Volume 3 [EN010143/APP/6.3]**, the north-east extent of the Solar PV Site Study Area (north-east of Gribthorpe) is contained within a Nitrate Vulnerable Zone (NVZ). This includes Ecology Mitigation Areas 1g and 1h, as well as Solar PV Areas 1b, 1e and 1f. It also includes the Interconnecting Cable Corridor towards the south of Solar PV Area 1e and Site Access north of Solar PV Area 1f. NVZs are areas designated as being at risk from agricultural nitrate pollution. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015 (Ref. 9-92). The Scheme is contained within the S249 Foulness from Black Beck to Market Weighton Canal NVZ.

Nature Conservation Sites

9.5.67 Statutory sites that are designated for nature conservation within the Study Area have been identified through a review of MAGIC map (Ref. 9-49) and are shown on **Figure 9-1, ES Volume 3 [EN010143/APP/6.3**. There are no international sites designated for nature conservation within 1km of the Solar PV Site. However, there is potential for hydrological connectivity to the Lower Derwent Valley SAC, SPA, NNR and Ramsar site via tributaries of the River Derwent (including from Solar PV Area 1a and 1b via Birk Lane Drain and its tributaries, and from Solar PV Area 2a via Fleet Dike), as shown in **Figure 9-1 ES Volume 3.** The River Derwent SAC and SSSI are considered later in connection to the Grid Connection Corridor study area.

9.5.68 The Lower Derwent Valley SAC (approximately 1.30 km north-west of the Order limits) is selected due to the presence of Annex I Habitats Directive habitats, specifically lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*). Alluvial forests with alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*) are also a qualifying feature. Otter (*Lutra lutra*) are a qualifying species. Refer to **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]** for further details.

9.5.69 The Lower Derwent SPA (approximately 1.30 km north-west of Order limits) qualifies by regularly supporting nationally important winter numbers of

Annex I species Bewick's swan (*Cygnus columbianus bewickii*), Golden plover (*Pluvialis apriaria*) and ruff (*Philomachus pugnax*). It supports a breeding population of Shoveler (*Spatula clypeata*). It also qualifies as an area of international importance to waterfowl by regularly supporting over 20,000 waterfowl in winter and supports nationally important numbers of migratory species including shoveler and ruff. Refer to **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]** for further details.

9.5.70 The Lower Derwent Ramsar site (approximately 1.30 km north-west of the Order limits) represents one of the most important examples of traditionally managed species-rich alluvial flood meadow habitat remaining in the UK. The river and flood meadows play a substantial role in the hydrological and ecological functioning of the Humber Basin. The site has a rich assemblage of wetland invertebrates including 16 species of dragonfly and damselfly, 15 British Red Data Book wetland invertebrates as well as a leafhopper, (*Cicadula ornate*) for which Lower Derwent Valley is the only known site in Great Britain. The site qualifies as a staging post for passage birds in spring. Of particular note are the nationally important numbers of ruff and whimbrel (*Numenius phaeopus).* Refer to **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]** for further details.

9.5.71 The Lower Derwent Valley NNR (1.47 km north-west of the Order limits) is comprised of a series of flood meadows, pastures and woodlands. The reserve supports a rich diversity of plant species and populations of breeding and wintering birds.

9.5.72 The Barn Hill Meadows SSSI is located approximately 1.01 km south-east of the Order limits and comprises seven fields lying in the flood plain of the Old Derwent. The site is important for its herb-rich, unimproved, neutral grassland. The fields have been traditionally managed for hay. Boundary hedgerows and ditches form an integral part of the SSSI (Ref. 9-51). These are located within the Humber Estuary TraC catchment. There is potential connectivity to these sites via drains rising in Solar PV Area 3c, and so the site is considered here despite being marginally over 1 km from the Order limits. The SSSI is currently in favourable condition.

9.5.73 There would also be potential connectivity to Derwent Ings SSSI and Breighton Meadows SSSI, which are further than 1km from the Solar PV Site Study Area, via tributaries of the River Derwent (see **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]**).

9.5.74 Derwent Ings SSSI (approximately 1.47 km northwest of the Order limits) consists of a series of neutral alluvial flood meadows, fen and swamp communities and freshwater habitats lying adjacent to the River Derwent between Sutton upon-Derwent and Menthorpe. The SSSI is important as a habitat for a wide range of breeding wetland bird species and important wintering bird populations. Breeding wildfowl include shoveler, shelduck (*Tadorna tadorna*), pintail (*Anas acuta*), gadwall (*Anas strepera*) and garganey (*Anas querquedula*). In winter the Ings support internationally important concentrations of waterfowl (greater than 20,000 individuals) together with nationally important numbers (greater than 1% British wintering population) of Bewick's swan, teal wigeon, mallard, pochard, golden plover and ruff. Nationally important numbers of whimbrel occur in late April and early May. The freshwater dyke system of the Ings support a rich diversity of plant species including two nationally scarce species, greater water-parsnip

(*Sium latifolium*) and flat-stalked pondweed (*Potamogeton freisii*). The site has an outstanding assemblage of invertebrates with species associated with the dykes and the fen and swamp habitats being particularly significant. These include up to 16 species of damselflies and dragonflies, together with a variety of species of other invertebrate groups including three nationally rare species, a snail killing fly (*Sciomyza dryomyzina*), a fresh water snail (*Lymnaea glabra*) and a Ptilid beetle (*Acrotrichis subcognata*). The SSSI is at 48.52% favourable condition.

9.5.75 Breighton Meadows SSSI (approximately 1.30 km northwest of the Order limits) supports nationally and internationally important alluvial flood meadow plant community and its outstanding assemblage of breeding birds associated with lowland damp grasslands. Breighton Meadows forms part of a complex of similarly species-rich alluvial flood meadow sites in the Lower Derwent Valley which include the Derwent Ings, Melbourne and Thornton Ings and Newton Mask. Together these four sites represent one of the most important examples of agriculturally unimproved species-rich alluvial flood meadow habitat remaining in the UK. The site is important as a habitat for a range of breeding wetland bird species. Breeding waders include snipe (*Gallinago gallinago*), lapwing (*Vanellus vanellus*), redshank (*Tringa tetanus*) and curlew (*Numenius arquata*). Breeding wildfowl include shoveler, mallard (*Anas platyrhynchos*) and teal (*Anas crecca*). The site is in favourable condition.

9.5.76 The Howden Marsh Local Nature Reserve (LNR) is located approximately 1.70 km south-east of the Order limits (from Solar PV Area 3c) and is an old fenland marsh much of which has never been drained. It is particularly rich in water beetles and supports water vole. There is potential connectivity between the Site and the LNR via Duck Swang Drain.

9.5.77 The Humber Estuary is located approximately 3.42 km to the south of the Order limits (from Solar PV Area 3c), and is designated as a SAC, SPA, Ramsar and SSSI. While the designations are outside of the Study Area, there is in principle hydrological connectivity to them via a network of drains, some of which originate within, or cross, the Solar PV Site. As such, it is necessary to include these designations within the baseline. The Humber Estuary SAC contains Annex I habitats and Annex II species. The Humber Estuary SPA is an extensive wetland and coastal habitat system. The estuary supports important numbers of waterbirds. The SSSI is designated as being a representative example of a near natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. 1.31% of the SSSI area is currently in unfavourable condition.

9.5.78 Full details of ecological designations are provided within **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1].**

Flood Risk

9.5.79 Flood risk from tidal and fluvial sources for the Solar PV Site is summarised in **Table 9-12.** Refer to **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]** for mapping of tidal/fluvial flood risk in relation to the Scheme, and **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]** for mapping of surface water flood risk.

Table 9-12. Flood Risk from Tidal and Fluvial Sources – Solar PV Site

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (majority), High (North/north-east associated with River Foulness, central site area to the west associated with Fleet Dike and its local drainage tributaries).	Flood risk to the Solar PV Site study area is predominantly from fluvial sources. The majority of this area is located within Flood Zone 1; however, Solar PV Areas 2a and 1e are partially located in areas of Flood Zone 2 and 3. Land in Flood Zone 1 is assessed as having less than a 0.1% AEP of fluvial or tidal flooding. The land in Flood Zone 2 is assessed as having between a 1% and 0.1% AEP of river flooding; or land having between a 0.5% and 0.1% AEP of tidal flooding. Flood Zone 3 is separated into 3a and 3b. The land in Flood Zone 3a is assessed as having a 1% or greater annual probability of fluvial flooding or a 0.5% or greater AEP of tidal flooding. The land in Flood Zone 3b is assessed as having a 3.3% or greater AEP of flooding. **Solar PV Area 2a:** According to the Environment Agency Flood Map for Planning (Ref. 9-56), Solar PV Area 2a is located within Flood Zone 2 with a small area in the south located in Flood Zone 3. A hydraulic model of the River Derwent (2016), which was provided by East Riding of Yorkshire Council, was used to inform the assessment. The 2016 River Derwent hydraulic model was updated to the latest model software version. The hydraulic model was simulated for the 3.3% AEP, 1% AEP, 1% AEP + climate change, and 1% AEP Credible Maximum Scenarios. The hydraulic model does not include representation of flood defences present along the River Derwent and therefore model simulations are undefended scenarios representing the worst case. For the undefended 1% AEP plus climate change event, flood depths are generally below 0.60 m across the parcel, with higher depths of up to 1.40 m in the south of the parcel close to Fleet Dike (tributary of the River Derwent). The maximum modelled flood depths across the parcel during the undefended 3.3% AEP event indicated that solar PV panels will be located within Flood

Flood Risk Source	Flood Risk Level	Comments
		Zone 3b. Generally, flood depths are below 0.60 m across the parcel, with higher depths of up to 1.10 m in the south of the parcel in close proximity to the Fleet Dike. During the 3.3% AEP event, maximum flow velocities are generally less than 0.20 m/s across the parcel, reaching a maximum flow velocity of approximately 0.30 m/s along the eastern boundary of the parcel. Mitigation measures for the Solar PV Panels located within Flood Zone 2 and 3 therefore need to be incorporated into the design of the Solar PV Site (see Section 9.6). **Solar PV Area 1e** According to the Environment Agency Flood Map for Planning (Ref. 9-56), Solar PV Area 1e is partially located within Flood Zone 2 and 3. In the absence of hydraulic modelling, a flood level has been estimated based on LiDAR data and the Environment Agency Flood Zone extents. Given the absence of modelled data, the Flood Zone 2 extent has been used as a proxy for climate change. LiDAR data shows that the approximate ground level at the edge of the Flood Zone 2 extent in Parcel 1e is 4.20 m AOD which is therefore considered to be the approximate flood level associated with this Flood Zone at this location. LiDAR data shows that the lowest ground level in the Solar PV Site in Flood Zone 2 and 3 is approximately 3.00 m AOD which coincides with topographic low points associated with small drainage channels that outfall to the River Foulness. Mitigation measures for the Solar PV Panels located within Flood Zone 2 and 3 have been incorporated into the design of the Solar PV Site (see Section 9.6). As hydraulic modelling results were not available, it has not been possible to be determine the Flood Zone 3b extent. The East Riding of Yorkshire SFRA

Flood Risk Source	Flood Risk Level	Comments
		(Ref. 9-69) produced in 2019 provides mapping of Flood Zone 3b using the 5% AEP event which does not show Parcel 1e to be located within Flood Zone 3b. Historic flood mapping and recorded flood outlines for the Site and the surrounding area show that there have been a number of flood events where fluvial flooding occurred in the Solar PV Site study area. These events were recorded in 1991, 2000, 2007 and 2020. Based on this information, the risk to the majority of the Solar PV Site study area from fluvial sources is considered to be low, however the risk is considered to be high to Parcels 2a and 1e.
Tidal	Low (majority), high (Parcel 2a associated with Fleet Dike)	The predominant risk to the Solar PV Site study area is from fluvial sources. However, the River Derwent and River Foulness are tidally influenced. **Solar PV Area 2a** As part of the hydraulic modelling, the Credible Maximum Scenario (H++) has been simulated which accounts for sea level rise. Plate 5-5 within the FRA shows the maximum modelled flood depths across the parcel during the undefended H++ event. This indicates that flood depths across the parcel are generally below 0.60 m and reach up to approximately 1.60 m in the south of the parcel in close proximity to the Fleet Dike. Based on this information, it is considered that there is a high risk from tidal sources to Parcel 2a. Mitigation measures for the Solar PV Panels in this area therefore have been incorporated into the design of the Solar PV Site (see Section 9.6). **Solar PV Area 1e** The River Foulness discharges to the Market Weighton Canal which discharges to the River Humber estuary and is tidally influenced. The River Foulness discharges to the Market Weighton Canal approximately 7.5 km to the south-east of parcel 1e. The Market Weighton Canal discharges to the Rive Humber estuary via Weighton Lock. Weighton Lock is managed and

Flood Risk Source	Flood Risk Level	Comments
		controlled by the Environment Agency, whilst the Ouse and Humber Drainage Board manage the Market Weighton Canal. Due to controls of the Market Weighton Canal and the distance from the parcel to the confluence of the River Foulness and Market Weighton Canal, it is considered that there is minimal tidal influence on the River Foulness and therefore a low risk to the parcel from tidal flooding. **Tidal - Residual Risk** Due to the presence of flood defences along the northern and southern sections of the River Derwent, there is a residual risk of flooding to the Solar PV Site study area if there was overtopping or a breach of the flood defences. The Environment Agency Reduction in Risk of Flooding from Rivers and the Sea mapping (see FRA) shows that the areas of the Solar PV Site within Flood Zone 3 are in an area where is a reduction in the risk of flooding, as seen on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. The hydraulic modelling undertaken for the Scheme does not include representation of the River Derwent flood defences. As a consequence, specific breach modelling of the defences is not required as the hydraulic modelling undertaken to inform the assessment represents the undefended and worst case scenario of flood risk to the Scheme. Mitigation is required for the Scheme, as described in Section 8.
Surface Water (pluvial)	Very low (majority), low – high (localised shallow patches)	As defined by the Environment Agency, the following levels of surface water flood risk can be classified as follows: a. High Risk – the area has an annual chance of flooding of greater than 3.33% AEP (1 in 30 year). b. Medium Risk – the area has an annual chance of flooding of between 1% AEP (1 in 100 year) and 3.33% AEP (1 in 30 year). c. Low Risk – the area has an annual chance of flooding of between 1 in 1000 year (0.1% AEP) and 1 in 100 year (1% AEP).

Flood Risk Source	Flood Risk Level	Comments
		d. Very Low Risk – the area has an annual chance of flooding of less than in 1000 year (0.1% AEP). From a review of the Environment Agency's Risk of Flooding from Surface Water Map (Ref. 9-72), the majority of the Solar PV Site study area is considered to be at 'Very Low' risk of surface water flooding (illustrated in **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]**). This means that each year this area has a chance of flooding of less than 0.1%. An allowance for rainfall (+40%) has been included as part of the hydraulic modelling for the Scheme to account for climate change. Plate 5-6 in the FRA shows the 1% AEP plus climate change event results. This shows that the majority of the Site does not experience surface water flooding and, where flooding does occur, the majority of flood depths on the Site are less than 0.20 m. There are areas where depths are higher, reaching up to approximately 0.70 m, including in the north-west of the Site where there are local depressions coinciding with the drainage ditches across the Site. The higher depths present on the north-eastern boundary of the Site is due to fluvial risk from the River Foulness, described above. Based on this information, the risk from surface water flooding to the majority of the Site is considered to be very low, with small areas considered to be at low to high risk.
Groundwater	Low	The British Geological Survey (BGS) Groundwater Flood Map (Ref. 9-48) shows that the majority of the Solar PV Site study area is not within an area where there is potential for groundwater flooding to occur, with few isolated areas where there is potential for groundwater flooding to occur at the surface. A review of the East Riding of Yorkshire SFRA (Ref. 9-69) indicates that susceptibility to groundwater flooding is predominantly less than 25%. There are areas to the south, near North Howden, and to the north and east, towards Spaldington and along the River Foulness, located in areas shown to be slightly more susceptible to groundwater flooding (25-50% and 50-70%

Flood Risk Source	Flood Risk Level	Comments
		susceptibility). It is considered that groundwater flood risk is unlikely to increase from the Solar PV Site study area as the majority of the infrastructure (e.g. solar PV panels, Field Station Units/Field Substations, Grid Connection Substations, etc.) will be above the ground surface. Infiltration into the soil and underlying geology will remain as per existing conditions. According to BGS borehole records (Ref. 9-48), there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface during times of elevated groundwater levels. Based on this information, the risk from groundwater flooding to the Site is considered to be low.
Sewers	Low	It is considered unlikely that flooding from sewers will impact the Solar PV Site study area as they are located within arable fields. A search undertaken to identify Yorkshire Water sewerage assets within the Site did not identify any public sewers, therefore the risk to the Site from sewer flooding is considered to be very low.
Artificial Sources	Low	Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs. **Reservoirs** Parts of the Solar PV Site and Interconnecting Grid Corridor are located within the extent associated with the risk of flooding from a reservoir breach. Areas of the Site are covered by the combined risk of when there is also flooding from rivers including Solar PV Areas 1e, 2a, 2c, 2d, 2f, 2g, 3a. 3b and 3c (see **FRA, Appendix 9-3, ES Volume 2 [EN010143/APP/6.2**]). Statutory reservoirs (large, raised reservoirs with volumes above ground of 25,000 m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. Whilst the consequence of failure can be significant, the likelihood of failure is typically low. Therefore, the risk of flooding from this source is considered low.

Flood Risk Source	Flood Risk Level	Comments
		Canal Systems There are no canals near the Solar PV Site Study Area. The River Foulness discharges to the Market Weighton Canal approximately 7.5 km to the south-east of parcel 1e, and so is not considered to present a flood risk to the Solar PV Site Study Area. Based on the information above, the Solar PV Site Study Area is considered to be at low risk of flooding from artificial sources.

Grid Connection Corridor

Geology, Groundwater and Soils

9.5.80 The Grid Connection Corridor Study Area is primarily underlain by two bedrock geologies (Ref. 9-48) which include:

a. Mercia Mudstone Group – comprising mudstone, which covers the of the north-eastern extent of the Grid Connection Corridor Study Area; and

b. Sherwood Sandstone Group – comprising sandstone, which covers the south-west of the Study Area.

9.5.81 The bedrock underlying the Grid Connection Corridor is largely overlain by clay superficial deposits including:

a. Hemingbrough Glaciolacustrine Formation – comprising clay, silt;

b. Thorganby Clay Member – comprising clay and silt in the north of Study Area; and

c. Warp – comprising clay and silt. Situated along the River Ouse and River Derwent.

9.5.82 There are also deposits of Breighton Sand Formation – comprising sand and silt across the Study Area.

9.5.83 Deposits of Alluvium (comprising clay, silt, sand and gravel) are also mapped along the course of River Ouse and River Derwent.

9.5.84 The Mercia Mudstone Group is classified as a Secondary B aquifer. The Sherwood Sandstone is classified as a Principal Aquifer. The clayey superficial deposits to the north of the site are classified as Secondary (undifferentiated) aquifers. Towards the south of the site, the superficial deposits which predominantly comprise of the Breighton Sand Formation and Alluvium have been designated as Secondary A aquifers. Secondary A aquifer refer to the rock layers which support local water supply and in some cases support baseflow to rivers.

9.5.85 It is likely that the overlying thick clay deposits create confined groundwater conditions in the underlying bedrock aquifers. There appears to be limited connection between the bedrock aquifer and the River Ouse and River Derwent with clay layers noted in the Alluvium and Breighton Sand which may limit baseflow in the area.

9.5.86 There are several borehole logs available online on the BGS Geoindex (Ref. 9-48) website across the Study Area, eight of these include groundwater level data which has been reviewed herein. The boreholes are summarised in **Table 9-15**.

Table 9-13. Groundwater level information from BGS GeoIndex – Grid Connection Corridor Study Area

Reference	Location	Easting	Northing	Depth (m)	Aquifer	Water Struck (mbgl)	Rest Water level (mbgl)
SE63/97	West Hag Farm	468500	430600	50	Sherwood Sandstone Group	NR[7]	8
SE62/97	Near Babthorpe Farm Hemingbrough	469291	429892	92	Sherwood Sandstone Group	42	5.65
SE62/94	The Read School Drax	467760	426771	39	Sherwood Sandstone Group	NR	9.75
SE73SW20	Newsholme Barmby 6	470610	430020	11	Superficial	3	3
SE62NE225	Lancashire – Yorkshire Motorway M62 A729	467890	428650	2.06	Superficial	0.9	0.9
SE62NE210	Lancashire – Yorkshire Motorway M62 A682	467500	428330	3	Superficial	2.7	2.7
SE62NE127	Goole Power Station 12	466812	427023	36.58	Superficial	2.4	2.1
SE62NE128	Goole Power Station 13	467222	427341	25.3	Superficial	5.2	2.1

[7] NR = Not Recorded

9.5.87 Groundwater level data was received from the Environment Agency from the Sherwood Sandstone Aquifer (**Plate 9-2**). It displays data from January 2017 until July 2022. Groundwater level fluctuates approximately 1 m seasonally with highest groundwater levels in March and April.

9.5.88 As described for the Solar PV Site Study Area, the direction of groundwater flow is generally consistent with the groundwater data from the Environment Agency which indicates a south-west groundwater flow direction. However, the groundwater levels are likely to be influenced locally by abstraction points to the south-west, identified by their Source Protection Zones.

9.5.89 **Plate 9-3** shows groundwater level data received from the Environment Agency from the superficial deposits. They show groundwater levels fluctuate seasonally from approximately 1 to 5 m.

9.5.90 Although there is limited groundwater level data available for the Grid Connection Corridor Study Area, it is considered likely that groundwater levels in the Sherwood Sandstone Group aquifer will be confined by the overlying superficial clay deposits, where these clayey deposits are present in sufficient thickness.

9.5.91 According to the BGS borehole records in **Table 9-13**, the sands beds within clay deposits may also hold groundwater. Depth to groundwater within these interbedded sand beds in the Alluvium deposits and the Breighton Sand Formation is expected to be shallow (less than 3 m below ground level).

9.5.92 The Study Area falls within three WFD groundwater body catchments (Ref. 9-47), see **Figure 9-3: Groundwater Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]**. The north-east of the Grid Connection Corridor falls within the East Riding Mercia Mudstone (GB40402G990200). The west of the Site falls within the Derwent Sherwood Sandstone (GB40401G700600). These were both described above in relation to the Solar PV Site. The southern end of the Grid Connection Corridor and associated Study Area falls within Wharfe & Lower Ouse Sherwood Sandstone (GB40401G702400) groundwater body.

9.5.93 The Wharfe & Lower Ouse Sherwood Sandstone (GB40401G702400) covers a total area of 379.2 km^2 and during 2019 Cycle 3, is at Poor Status overall. It has Good Quantitative Status and Poor Chemical Status (Ref. 9-47). The limiting element within the chemical status is the chemical drinking water protected area, designated as Poor when the other parameters are all Good. The reasons for not achieving Good status and reasons for deterioration are all ‘unknown (pending investigation)’. The water body had an objective of Good by 2021, which it has not met.

9.5.94 The SPZ at Barmby Reservoir was mentioned in relation to the Solar PV Site, but is also in the Study Area for the Grid Connection Corridor (centred on NGR SE 70284 29694). The southern extent of the Grid Connection Corridor including the Drax Power Station and further south is SPZ III (Total Catchment) associated with abstractions around Carlton. Total Catchment is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

9.5.95 The Soilscape map viewer (Ref. 9-52) describes the majority of the soils beneath the Grid Connection Corridor to the north and south 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.

9.5.96 Underlying the centre of the Grid Connection Corridor Study Area surrounding the River Ouse and River Derwent are soils described as 'Loamy and Clayey soil of coastal flats with naturally high groundwater' and 'Loamy soils with naturally high groundwater'. These soils have moderate fertility and tend to drain to local groundwater.

9.5.97 At the northern extent of the River Derwent within the Grid Connection Corridor Study Area there is a patch of soils described as 'Loamy and clayey floodplain soils with naturally high groundwater' which has moderate fertility and is most at risk from pollution from floodwater scouring. There are also patches of 'Naturally wet very acid sandy and loamy soils' and 'freely draining slightly acid sandy soils'.

Water Resources

Surface Water Abstractions

9.5.98 There are nine surface water abstraction licenses within the Grid Connection Corridor Study Area based on Environment Agency data. These are plotted in **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]** and available details are as follows:

a. Licence 2/27/28/083 (A1) abstracts from the River Derwent north of Barmby on the Marsh for public water supply with a maximum abstraction rate of 114,000 m^3/d;

b. Licence 2/23/28/140 (A4, A5 and A6) abstracts from the River Derwent between Wressle and Loftsome Bridge for spray irrigation with a maximum abstraction rate of 2,736 m^3/d;

c. Licence NE/027/0024/050/R01 (A7 and A8) abstracts from the Lendall Drain to the north of Drax Power Station for spray irrigation with a maximum abstraction rate of 900 m^3/d;

d. Licence NE/027/0028/032 (A10) abstracts from the River Derwent at Wressle for spray irrigation with a maximum abstraction rate of 820 m^3/d;

e. Licence NE027/0028/048 (A11, A12 and A13) abstracts from the River Derwent (A11 and A12 near Barmby on the Marsh and A13 near Wressle) for spray irrigation with a maximum abstraction rate of 1440 m^3/d;

f. Licence 2/27/24/155 (A14) abstracts from the River Ouse from of Drax Power Station for energy production with a maximum abstraction rate of 484,000 m^3/d;

g. Licence 2/27/24/194 (A15, A16 and A17) abstracts from Carr Dyke and River Ouse close to Drax Power Station for spray irrigation with a maximum abstraction rate of 820 m^3/d;

h. Licence 2/27/24/195 (A18) abstracts from Drax Abbey Fish Pond for spray irrigation with a maximum abstraction rate of 820 m^3/d; and

i. Licence 2/27/24/467/R01 (A19) abstracts from the River Ouse north of Drax Power Station for spray irrigation with a maximum abstraction rate of 1440 m^3/d.

Ground Water Abstractions

9.5.99 There are six ground water abstraction licenses within the Grid Connection Corridor Study Area based on Environment Agency data. These are plotted in **Figure 9-3: Groundwater Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]** and available details are as follows:

a. Licence 2/27/09/196/R01 (G2) abstracts from the Sherwood sandstone near Barmby on the Marsh for spray irrigation with a maximum abstraction rate of 130 m^3/d;

b. Licence 2/27/24/197 (G3 and G4) abstracts from the Sherwood sandstone adjacent to Drax Power Station for spray irrigation with a maximum abstraction rate of 303 m^3/d;

c. Licence 2/27/28/250/R01 (G8) abstracts from the Sherwood sandstone northeast of Hemingbrough for spray irrigation with a maximum abstraction rate of 500 m^3/d;

d. Licence 2/27/28/270/R01 (G10) abstracts from the Sherwood sandstone north of Barmby Reservoir for public water supply with a maximum abstraction rate of 5,000 m^3/d; and

e. Licence NE/027/0028/029/R01 (G12) abstracts from the Sherwood sandstone southeast of Hemingbrough for spray irrigation with a maximum abstraction rate of 2,200 m^3/d.

Private Water Supplies

9.5.100 There are no PWS located in the Grid Connection Corridor Study Area based on data requested for the Scheme.

Consented Discharges

9.5.101 Information on consented discharges (Water Activity Permits) were obtained from the Environment Agency and are presented in **Table 9-14** and plotted in **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3].**

Table 9-14. Consented discharges (Water Activity Permits) in the Grid Connection Corridor study area

Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D1	NE/D119/001	1-7 & 9 Station Road	River Ouse	Sewage discharges - final/treated effluent - not water company
D2	NE/S/P/1491/001	Seaview	River Derwent	Sewage discharges - final/treated effluent - not water company
D3	NE/QC.27/28/0029/001	The Paddock	Derwent Via Unnamed Drain	Sewage discharges - final/treated effluent - not water company
D4	NE/S/P/1041/001	Loftsome Bridge Coaching House	River Derwent	Sewage discharges - final/treated effluent - not water company
D5	NE/WA6460/001	Loftsome Bridge Farm	Tributary Of River Derwent	Sewage discharges - final/treated effluent - not water company
D7	NE/WADC485/001	Barmby	River Derwent	Trade discharges - process effluent - water company (wtw)
D8	NE/335/001	Marshfield House	Dyke To Treeton Drain	Sewage discharges - final/treated effluent - not water company
D9	NE/935/001	Bishop Meadows Farm	Tributary Of River Derwent	Sewage discharges - final/treated effluent - not water company
D10	NE/1495/001	Babthorpe Cottages	Tributary Of River Derwent	Sewage discharges - final/treated effluent - not water company
D12	NE/1397/001	Derwent House	Fleet Dyke/River Derwent	Sewage discharges - final/treated effluent - not water company
D13	NE/1197/001	Nos 1-2 Main Street	Tributary Of River Ouse	Sewage discharges - final/treated effluent - not water company

Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D14	NE/1749/001	Barmby-On-The-Moor Pumping Stn	Tributary Of Sails Brook/The Brook/River Derwent	Sewage discharges - sewer storm overflow - water company
D15	NE/1086/001	Barmby On The Marsh Wpc Works	Tributary Of River Derwent	Sewage discharges - pumping station - water company
D16	NE/623/001	Eastholme	Black Tom Drain	Sewage discharges - final/treated effluent - not water company
D18	NE/3160/001	Barmby Tidal Barrage Housing Site	River Derwent	Sewage discharges - final/treated effluent - water company
D19	NE/1554/001	Dairy	Trib River Ouse	Trade discharges - cooling water
D20	NE/QC.27/24/0009/001	Barmby On The Marsh STW	Tidal River Ouse	Sewage discharges - stw storm overflow/storm tank - water company
D30	NE/2765(T)/004	Drax WPC Works	River Ouse	Sewage discharges - final/treated effluent - water company
D31	NE/4109/002	Drax Power Station	Carr Dyke	Trade discharges - site drainage (contam surface water, not waste sit
D32	NE/QR.27/24/0035/001	Barlow Ash Disposal Site	Abbey Dyke To Carr Dyke	Trade discharges - process effluent - water company (wtw)
D34	NE/2511/001	Toilet Accommodation	River Ouse	Sewage discharges - final/treated effluent - not water company
D36	NE/C5240/001	Drax Power Station	Carr Dyke	Trade discharges - site drainage
D37	NE/C5222/001	Drax Power Station	Northern Perimeter Drains	Trade discharges - site drainage
D38	NE/WA6464/001	National Power Plc	Carr Dyke	Miscellaneous discharges - surface water
D39	NE/QR.27/24/0012/001	Drax Power Station	Carr Dyke	Unspecified

Ref.	Registration Number	Discharge Site Name	Receiving Water	Effluent Type
D40	NE/C5239/001	Drax Power Station	Tributary Of Carr Dyke	Trade discharges - site drainage
D41	NE/C5223/001	Drax Power Station Sewage Works	Carr Dyke	Sewage discharges - final/treated effluent - not water company
D42	NE/2452/001	Ready Mixed Concrete Depot	Tributary Of River Ouse	Trade discharges - process effluent - not water company
D44	NE/CON1958/001	Drax Power Station	Carr Dyke	Sewage discharges - final/treated effluent - not water company
D45	NE/QR.27/24/0036/001	National Power-Drax Power Station -	Carr Dyke - Lendall Drain	Trade discharges - site drainage
D46	NE/3706/001	National Power Drax Power Station -	Carr Dyke	Trade discharges - unspecified
D47	NE/2284/001	Bungalow	Tributary Of River Ouse	Sewage discharges - final/treated effluent - not water company
D48	NE/2809/001	National Power-Drax Power Station -	Carr Dyke	Trade discharges - process effluent - not water company
D51	NE/669/001	Bungalow	Black Tom Drain/Ouse	Sewage discharges - final/treated effluent - not water company
D59	NE/C4560/001	Camblesforth Grange	Land/Carr Dike/Lendall Carr Drain	Trade discharges - cooling water

9.5.102 There are 35 Water Activity Permits within the Grid Connection Corridor study area. These are predominantly sewage discharges (water company and private) as well as a mix of trade discharges (including that from Drax Power Station). All discharges are to surface watercourses, including the River Ouse, River Derwent and numerous of their tributaries, as well as drains that are common across the area. None of these consented discharges are located within the Order limits.

Pollution Incidents

9.5.103 There were no Category 1 or 2 pollution incidents reported in the Study Area for the Grid Connection Corridor for the last five years. 12 lower category pollution incidents have been reported, but the locations of these have not been disclosed by the Environment Agency and so are not mapped on **Figure 9-1** or tabulated here. The majority are related to pesticides or storm sewage.

Water Resource Designations

9.5.104 The Study Area for the Grid Connection Corridor between Barmby on the Marsh and Wressle is within the same Drinking Water Safeguard Zone for surface water (designation SWSGZ6008 Elvington and Loftsome Bridge) as was identified for the Solar PV Site.

9.5.105 Immediately south of Drax Power Station there are two Drinking Water Safeguard Zones for groundwater. These fall within the far southern extent of the Study Area but do not intersect the Order limits. Firstly, Safeguard Zone GWSGZ0029 (identified for bentazone and nitrate) has its northern extent corresponding to the A645 highway to the south of Drax Power Station and immediately adjacent to the Site Access off the A465. Secondly, Safeguard Zone GWSGZ0301 (identified for mecoprop) is located east of Drax and is only on the very periphery of the Grid Connection Corridor study area.

9.5.106 The Grid Connection Corridor between Barmby on the Marsh and Wressle around the River Derwent is within the same Drinking Water Protected Area as identified in relation to the Solar PV Site (Water body ID104027068311 – River Derwent from Elvington Beck to River Ouse).

9.5.107 The Grid Connection Corridor crosses through two NVZs. These are the S282 Lowmoor Drain Catch (tributary of Derwent) NVZ to the east of Hemingbrough, and S274 Aire from River Calder to River Ouse NVZ in the southern extent of the Study Area for the Grid Connection Corridor south of Drax.

Nature Conservation Sites

9.5.108 Statutory sites that are designated for nature conservation and with the potential for a hydrological link to the Grid Connection Corridor were identified through a review of the MAGIC map (Ref. 9-49). The following sites were identified:

a. River Derwent SAC – Designated for the Annex I habitats, and presence of Annex II species such as River Lamprey, Sea Lamprey, Bullhead and Otter. The River Derwent is crossed by the Grid Connection Corridor;

b. River Derwent SSSI – Designated due it being considered one of the best British examples of the classic river profile. It supports diverse

communities of aquatic flora and fauna, many elements of which are nationally significant. The River Derwent is crossed by the Grid Connection Corridor. Natural England's designation information indicates that 94.47% of the SSSI currently has an unfavourable status (Ref. 9-49).

9.5.109 Further details regarding designated sites are given in **Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1]**.

Flood Risk

9.5.110 Flood risk from all sources for the Grid Connection Corridor Study Area is summarised in **Table 9-15**. Refer to **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]** for mapping of tidal/fluvial flood risk in relation to the Scheme, **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]** for mapping of surface water flood risk.

Table 9-15. Flood Risk from All Sources – Grid Connection Corridor Study Area

Flood Risk Source	Flood Risk Level	Comments
Tidal/Fluvial	High (defences are present)	The risk of flooding to the Grid Connection Corridor study area is predominantly from the River Ouse which is tidally influenced in this location. The majority of the Grid Connection Corridor is located within Flood Zone 2 and Flood Zone 3 associated with the River Ouse and River Derwent. Flood zones are illustrated on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3].** The Grid Connection Corridor intersects flood defence embankments both sides of the River Ouse and the River Derwent that provide a degree of protection to the landward side. However, there are a number of smaller channels and watercourses within the corridor that also pose a fluvial flood risk. The climate change mapping in the Selby SFRA (Ref. 9-70) uses the flood outline associated with a 0.5% AEP tidal event with relevant climate change allowances which shows flooding is more extensive around Drax when compared to present day flood risk. The SFRA mapping along the grid connection route (1% AEP plus 24% climate change Higher Central Sea Level Rise) appears to result in the same extent as the current Flood Zone 3 and does not exceed Flood Zone 2. Therefore, there is no change in flood risk to the Grid Connection Route to the south of the River Ouse. As the Grid Connection Corridor will be buried, it is considered that fluvial/tidal sources pose a very low risk during construction, operation and decommissioning.
Surface Water (pluvial)	Very low (majority) Low – high (localised shallow patches)	The risk of surface water flooding is generally very low in the Grid Connection Corridor Study Area (annual chance of flooding of less than 0.1% AEP) with isolated areas of low (chance of flooding of between 0.1% and 1% AEP) and, medium (chance of flooding of between 1% and 3.3% AEP) generally associated with topographical low points, drains and agricultural ditches. Flood risk from surface water is illustrated on **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]**. As the Grid Connection Corridor will be buried, it is considered that above surface water flooding poses a very low risk during construction, operation and decommissioning.
Groundwater	Very Low – Low	The BGS Groundwater Flood Map (Ref. 9-48) shows that the majority of the Grid Connection Corridor is located in an area where there is no or limited potential for groundwater flooding to occur. There are very small, isolated areas where there is potential for groundwater flooding to occur at the surface near the grid connection location.

Flood Risk Source	Flood Risk Level	Comments
		There is limited groundwater level data across the Site, however, there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface during times of elevated groundwater levels. A review of the Selby District Council SFRA (Ref. 9-70) indicates for the area of the Grid Connection Corridor located within the Selby District area there is predominantly no susceptibility to groundwater flooding with the exception of areas to the south of the Ouse, near Drax, which are located in areas shown to be less than 25% susceptible to groundwater flooding. East Riding of Yorkshire SFRA (Ref. 9-69) mapping indicates susceptibility to groundwater flooding is predominantly less than 25%, it is therefore considered the risk from this source is very low to low during construction and operation. Localised impacts on groundwater flows within the vicinity of the buried cable may occur but are unlikely to increase flood risk to vulnerable receptors as the Grid Connection Corridor is predominantly within green open space consisting of arable fields.
Sewers	Very Low	It is considered unlikely that flooding from sewers will impact the Grid Connection Corridor as the majority of the route is through arable fields. A search undertaken to identify Yorkshire Water sewerage assets within the Site did not identify any public sewers. The Selby Level 1 SFRA (Ref. 9-70) indicates that within the postcode areas within the Grid Connection Corridor, only zero to 2 incidences of sewer flooding have occurred and therefore the risk of flooding from this source is considered to be very low during construction, operation and decommissioning.

Flood Risk Source	Flood Risk Level	Comments
Artificial Sources	Negligible	The River Ouse, River Derwent and floodplain intersect the Grid Connection Corridor and is located within the extent associated with 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 small areas near Drax Power Station and south of Newsholme that would be flooded when river levels are normal (see **FRA, Appendix 9-3, ES Volume 2**). Statutory reservoirs (large, raised reservoirs with volumes above ground of 25,000 m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. Whilst the consequence of failure can be significant, the likelihood of failure is typically low. The risk of flooding from this source is considered negligible as the Grid Connection Cable will be buried. There are no canals in close proximity to the Grid Connection Corridor. Based on the information above, the Grid Connection Corridor is considered to be at negligible risk of flooding from artificial sources during construction, operation and decommissioning.

Future Baseline

9.5.111 The future baseline scenarios are set out in **Chapter 5: Environmental Impact Assessment Methodology, ES Volume 1 [EN010143/APP/6.1]** and described for the water environment below.

Future Baseline –No Development, Construction, Operation

Surface water

9.5.112 All WFD surface waterbodies identified within the Study Area (Derwent from Elvington Beck to River Ouse, Ouse from R Wharfe to Upper Humber, Humber Upper, Fleet Dike catchment (tributary of Ouse), Foulness from Black Beck to Market Weighton Canal and Birk Lane Drain Catchment (tributary of Derwent)) have a target of Good by 2027, with the exception of Barmby Reservoir which has a target of maintaining the existing Good Status, but which is scoped out of further assessment. However, these WFD classifications are subject to change during RBMP Cycle 3.

9.5.113 It is likely that through the action of new legislative requirements and ever more stringent planning policy and regulation, that the health of the water environment will continue to improve post-2027. The Environment Act 2021 (Ref. 9-1) includes measures to tackle storm sewage discharges and the Levelling-Up and Regeneration Act 2023 (Ref. 9-16) sets new requirements relating to nutrient (nitrogen and phosphorous) pollution standards (see Part 7 of the Act). There are, however, significant challenges such as adapting to a changing climate and pressures of population growth that could have a retarding impact. It is also difficult to forecast these changes with any certainty.

9.5.114 The current receptor importance criteria presented in **Table 9-3** is largely based on the presence or absence 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

9.5.115 The East Riding Mercia Mudstone WFD groundwater body is at its objective of Poor Status (2015), while the Derwent Sherwood Sandstone and Wharfe & Ouse Lower Sherwood Sandstone WFD waterbodies are below their target WFD objective of Good Status by 2021. However, these WFD classifications are subject to change during RBMP Cycle 3.

9.5.116 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

9.5.117 Climate change is predicted to alter both future tidal and fluvial flood risk and this is taken into account by the **FRA (ES Volume 3: Appendix 9-D [EN010131/APP/3.3])**.

9.5.118 As the Scheme has a development lifetime of 40 years, the impact of climate change needs to be considered. The Scheme has been assessed with a 75-year lifetime as a conservative approach in line with the NPPF (Ref. 9-22), which states that non-residential development should be assessed for a development lifetime of 75 years.

9.5.119 The Site is located within the Humber River Basin District and the River Ouse is tidally influenced along its reach within the study area. Sea level allowances have been calculated for the lifetime of the development in line with the Environment Agency Flood Risk Assessments Climate Change Allowances guidance.

9.5.120 Climate change allowances relate to predicted percentage increase in peak river flows and peak rainfall that the Scheme design must consider.

9.5.121 Peak river flow allowances are based on WFD catchment areas. The Environment Agency Website 'Climate change allowances for peak river flow in England' has been consulted to confirm the revised climate change allowances for the catchment areas that cover the study area (Ref. 9-73).

9.5.122 The Scheme is covered by three management catchments, each with their own climate change allowances for river flows:

a. The Grid Connection Corridor study area from Drax to the crossing of the Derwent is within the Wharfe and Lower Ouse Management Catchment which has a 'Higher Central' allowance of 31% (2080s) (for Essential Infrastructure);

b. The majority of the Solar PV Site Study Area is within the Derwent Humber Management Catchment which has a 'Higher Central' allowance of 33% (2080s) (for Essential Infrastructure); and

c. A small area to the east – south-east of the Solar PV Site is within the Hull and East Riding Management Catchment which has a 'Higher Central' allowance of 33% (2080s).

9.5.123 For peak rainfall intensity, the Scheme is covered by the same three management catchments as for river flows. Based on the assessed development lifetime of the Scheme being between 2027 and 2067, the central allowance for the 2070s epoch should be applied. This allowance for all management catchments is:

a. 3.3% AEP – Hull and East Riding 35%, other catchments 40%; and

b. 1% AEP – 40%.

9.5.124 These peak rainfall allowances have been considered within the **Framework Surface Water Drainage Strategy, Appendix 9-4, ES Volume 2 [EN010143/APP/9.4**] for the lifetime of the development.

9.5.125 In line with the Environment Agency climate change guidance for Nationally Significant Infrastructure Projects (NSIPs), such as power stations and power lines, flood risk should also be assessed for a credible maximum

climate change (extreme climate change) scenario. The Credible Maximum Scenario includes:

a. The H++ climate change allowances for sea level rise (+ 1.9 m);

b. The upper end allowance for peak river flow for the relevant management catchment;

   i. Hull and East Riding – 66%;

   ii. Derwent Humber – 54%;

   iii. Wharfe and Lower Ouse – 48%; and

c. An additional 2 mm for each year on top of sea level rise allowances from 2017 for storm surge.

9.5.126 The Credible Maximum Scenario sensitivity assessment has been undertaken as part of the **FRA (Appendix 9-3, ES Volume 3[EN010143/APP/3.3])**.

9.5.127 To adopt a conservative approach and account for any hydraulic modelling uncertainty, the Upper End allowance of +54% has been considered for fluvial flows within the design event. As the River Derwent is the main source of fluvial flood risk to the Solar PV Site study area, this was adopted as the most appropriate approach.

9.5.128 Refer to the **FRA (Appendix 9-3, ES Volume 3[EN010143/APP/3.3])** for further details.

Future Baseline– approximately 2067

9.5.129 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.

9.5.130 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 for decommissioning, assumed to be in 2067 (assumed to be the decommissioning date for the purposes of this assessment based on final commissioning in 2027 and a fixed lifespan of final commissioning plus 40 years, as per **Chapter 2: The Scheme ES Volume 1**), and so the impact assessment within this chapter is undertaken against existing baseline conditions. It is noted that changes to the construction period altering the date of start of operation and hence the decommissioning date would not alter this outcome.

Importance of Receptors

9.5.131 **Table 9-16** 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 9-3**. 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 importance may be high by virtue of supporting protected species or other important potable or socio-economic and recreational uses).

Table 9-16. Importance of Receptors

Waterbody	Importance
River Ouse (Ouse from R Wharfe to Upper Humber 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 1 m^3/s. It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution and there are surface water abstractions from the watercourse within the Study Area. The river's role in water supply and commercial scale navigation add to its importance. **Low importance** for morphology due to the heavily modified nature of the channel, particularly along the banks. **Very high importance** for navigation due to its commercial scale.
River Derwent (Derwent from Elvington Beck to River Ouse 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 1 m^3/s. It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution. The River Derwent is a designated SSSI and SAC within the Study Area, thereby providing internationally important habitat. It also receives treated sewage from Barmby on the Marsh Sewage Treatment Works (STW) and is therefore of importance for dispersal of this effluent. The river is also used for navigation. **Low importance** for morphology due to the heavily modified nature of the channel, particularly along the banks. It is largely devoid of morphological diversity and would naturally be a tidal watercourse but is now controlled by the Barmby Barrage. **Medium importance** for navigation as intermittently used by a small number of craft.
Humber Estuary (Humber Upper WFD Waterbody)	**Very High importance receptor** for water quality on the basis of its scale, being WFD designated, and supporting numerous international, national and local habitat designations (e.g. Humber Estuary SSSI, Humber Estuary SAC and Humber Estuary Ramsar). It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater. **Low importance** for morphology due to the heavily modified nature of the channel, particularly along the banks. **Very high importance** for navigation due to its commercial scale.

Waterbody	Importance
River Foulness (Foulness from Black Beck to Market Weighton Canal WFD waterbody)	**High importance** for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of less than 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 Foggathorpe STW and is therefore of importance for dispersal of this effluent. **Low importance** for morphology due to the heavily modified nature of the channel, which is dominated by fine sediment. No importance is assigned for navigation as the watercourse is not navigable (this applies to all watercourses listed below).
Fleet Dike (Fleet Dike Catch (tributary of Ouse) WFD waterbody)	**High importance** for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of less than 1.0 m^3/s. Water quality monitoring data indicates that the watercourse is under pressure from agricultural pollution. **Low importance** for morphology being artificial, straight, over-deep and dominated by fine sediment and thereby lacking morphological and bedform diversity.
Birk Lane Drain Catchment (tributary of Derwent) WFD waterbody	**High importance** for water quality on the basis of being a WFD designated watercourse but with an estimated Q95 flow of less than 1.0 m^3/s. Given water quality data in the surrounding area, the watercourse is expected to be under pressure from agricultural pollution. **Low importance** for morphology due to being straightened and lacking morphological diversity.
Aire from Fryston Beck to River Ouse WFD Water Body	**Very High importance** receptor for water quality on the basis of its scale, being WFD designated and having a Q95 flow greater than 1 m^3/s. It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater. **Low importance** for morphology due to the heavily modified nature of the channel.
Ubiquitous agricultural drains (ordinary watercourses / IDB watercourses)	As highly modified and often artificial, frequently ephemeral agricultural drains and ditches, these are considered **low importance** water features for water quality. They are also considered **low importance** for morphology as they are generally straight, often dredged, grossly over-deepened trapezoidal ditches lacking hydraulic variation.
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

Waterbody	Importance
	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 – Superficial Aquifers	Superficial deposits (sands within the Hemingbrough Glaciolacustrine Formation and the Thorganby Clay Member) and the Breighton Sand Formation are considered as **Medium Importance** as they are designated as Secondary aquifers. The clay deposits within the Hemingbrough Glaciolacustrine Formation and the Thorganby Clay Member are considered as **Low Importance** as they are unproductive.
Groundwater – Bedrock Aquifers	The Sherwood Sandstone is considered as a **High Importance** aquifer as it is designated as a Principal aquifer. Mercia Mudstone is considered as a **Medium Importance** aquifer as it is designated as a Secondary aquifer.

Floodplain Sensitivity for Impact Assessment

9.5.132 For the construction assessment, the key receptors in terms of all forms of flood risk are the construction workers present within the Site, who are considered to be of Very High sensitivity.

9.5.133 For the operational 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.

9.5.134 The majority of the Solar PV Areas lie in Flood Zone 1 and the risk of fluvial or tidal flooding is low. However, there are areas of Flood Zone 2 and 3 present within Solar PV Areas 1e and 2a associated with the River Foulness, Fleet Dike and their tributaries. Within these two parcels flood risk is considered to be high. These areas at risk of flooding are currently agricultural land.

9.5.135 The majority of the Grid Connection Corridor lies in Flood Zone 2 and 3 associated with the River Ouse and River Derwent, and so flood risk is high but flood defences are present. Land use associated with the Grid Connection Corridor study area includes agricultural land as well as Drax Power Station. In EIA terms the sensitivity around Drax Power Station is Very High, due to the presence of essential power supply infrastructure (see Table 9-3). However, the larger areas of agricultural land across the study area are less sensitive and not considered essential infrastructure.

9.5.136 The criteria described in **Table 9-3** 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:

a. Flooding from surface water – generally very low risk (annual chance of flooding of less than 0.1% AEP) for most of the site, with areas of low (chance of flooding between 0.1% and 1% AEP), medium (chance of flooding between 1% and 3.3% AEP) and high risk (chance of flooding of greater than 3.3% AEP) generally associated with flow pathways following topographic low points including drains and agricultural ditches.

b. Flooding from groundwater – SFRA mapping indicates susceptibility to groundwater flooding is predominantly less than 25% within the Solar PV Site and Grid Connection Corridor study areas, with areas to the south, near North Howden, and to the north and east of the Site, towards Spaldington and along the River Foulness, that are located in areas shown to be slightly more susceptible to groundwater flooding (25-50% and 50-70% susceptibility).

c. Flooding from sewers – considered low risk based on Yorkshire Water sewerage mapping and local SFRA information.

d. Flooding from artificial sources – the Order limits are considered at low risk from reservoir flooding given the requirements of the Reservoirs Act 1975 to ensure reservoirs are properly maintained, and given that there are no canals in close proximity to the Scheme.

9.5.137 Flood risk sensitivity is discussed further within the **FRA (ES Volume 3: Appendix 9-D [EN010131/APP/3.3])**.

9.6 Embedded Mitigation

9.6.1 Where practicable, mitigation measures have been incorporated into the Scheme design and/or how it shall be constructed. Through iterative assessment, potential impacts have been predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as far as practicable. This approach provides the opportunity to prevent or reduce potential adverse impacts from the outset. This embedded mitigation/mitigation by design approach has been taken into account when evaluating the significance of the potential impacts of the Scheme.

Construction and Decommissioning

Framework CEMP

9.6.2 The construction of the Scheme would take place in accordance with a Construction Environmental Management Plan (CEMP). The **Framework CEMP [EN010143/APP/7.7])** details the measures that would be undertaken during construction to mitigate the temporary effects on the water environment. It provides the framework for the detailed CEMP, which will be produced post-consent once a contractor is appointed and is proposed to be secured through a requirement of the DCO (see **draft DCO [EN010143/APP/3.1]**).

9.6.3 The Framework CEMP comprises best practice methods to manage environmental impacts during construction, all of which are established and effective measures employed on other nationally significant infrastructure projects. In relation to impacts on the water environment, the measures within the Framework CEMP will focus on managing the risk of pollution to surface waters and the groundwater environment. It will also consider the management of activities within floodplain areas (i.e. activities kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable).

9.6.4 The Framework CEMP will be reviewed, revised and updated as the Scheme progresses towards construction to ensure potential impacts and residual effects are considered and mitigated as far as practicable, in keeping with applicable good practice at the relevant point in time. The principles of the mitigation measures set out below are the minimum standards that the Contractor would be required to implement. 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 would be continually reviewed and adapted as construction works progress (e.g. the management of construction site runoff containing excessive levels of fine sediments).

9.6.5 The Framework CEMP will set out the standard procedure for the Scheme and describe the principles for the protection of the water environment during construction. The detailed CEMP will be supported by a Water Management Plan (WMP) providing greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction. The WMP will be secured, as part of the CEMP, through a DCO Requirement and would be produced post-consent. The potential for adverse impacts would be minimised by the adoption of the general mitigation measures outlined below, which would be described in the WMP and CEMP.

9.6.6 The construction of the Scheme will be undertaken in accordance with best practice as detailed below.

Good Practice Guidance (GPP)

9.6.7 The following relevant GPPs have been released to date on the NetRegs website (Ref. 9-75) and are listed below. While these are not regulatory guidance in England (but are in Scotland, Wales and Northern Ireland), where the UK government website outlines regulatory requirements (Ref. 9-93), it remains a useful resource for best practice. The best practice approaches will be secured through the Framework CEMP **[EN010143/APP/7.7]**:

a. GPP 1: Understanding your environmental responsibilities – good environmental practices;

b. GPP 2: Above ground oil storage;

c. GPP 3: Use and design of oil separators in surface water drainage systems;

d. GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;

e. GPP 5: Works and maintenance in or near water;

f. GPP 6: Working on construction and demolition sites;

g. GPP 8: Safe storage and disposal of used oils;

h. GPP 13: Vehicle washing and cleaning;

i. GPP 19: Vehicles: Service and Repair;

j. GPP 20: Dewatering underground ducts and chambers;

k. GPP 21: Pollution Incident Response Plans;

l. GPP22: Dealing with spills; and

m. GPP26: Safe storage – drums and intermediate bulk containers.

9.6.8 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:

a. PPG7: Safe storage – the safe operation of refuelling facilities (Ref. 9-76); and

b. PPG18: Managing fire water and major spillages (Ref. 9-77).

9.6.9 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:

a. British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works (Ref. 9-78);

b. British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites (Ref. 9-79);

c. C753 (2015) The SuDS Manual (second edition) (Ref. 9-31)

d. C741 (2015) Environmental good practice on site guide (fourth edition) (Ref. 9-80);

e. C648 (2006) Control of water pollution from linear construction projects, technical guidance (Ref. 9-81);

f. C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (Ref. 9-82);

g. C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (Ref. 9-83); and

h. C736F (2014) Containment systems for prevention of pollution (Ref. 9-84).

Management of Construction Site Runoff

9.6.10 Mitigation measures are described in detail below and will be adhered to during the construction phase of the Scheme. They apply equally to all components of the Scheme where necessary.

9.6.11 The measures outlined below, which are included in the **Framework CEMP [EN010143/APP/7.7]**, would be required for the management of fine particulates in surface water runoff that may occur as a result of the construction activities:

a. 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. 9-83) and CIRIA report ‘C648 Control of water pollution from linear construction sites’ (Ref. 9-81). Measures may include use and maintenance of temporary lagoons, tanks, bunds and fabric silt fences etc. or silt screens as well as consideration of the type of plant used;

b. 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 water features in the Site and ensuring that they are adequately protected using drain covers, sand bags, earth bunds, geotextile silt fences, straw bales etc., or proprietary treatment (e.g. lamella clarifiers);

c. Where practical, earthworks will be undertaken during the drier months of the year and earth moving works will avoid periods of very wet weather, 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 Contractor in accordance with the pollution prevention principles described in this chapter;

d. To protect watercourses from fine sediment runoff, topsoil/subsoil will be stored a minimum of 20 m 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;

e. Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided;

f. Construction site runoff will either be treated on Site and discharged to Controlled Waters (potentially also including infiltration to ground) or to the nearest public sewer with sufficient capacity for treatment following discussions with Yorkshire Water, or else removed from site for disposal at an appropriate and licensed waste facility;

g. Equipment and plant are to be washed out and cleaned in designated areas within the temporary construction Compounds or at Johnson's Farm, where runoff can be isolated for treatment before disposal as outlined above;

h. 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;

i. 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;

j. Should the use of herbicide or other spray chemical be required, a method statement, operating procedure or similar will be prepared prior to the work commencing. This will include measures to protect ground and surface water, including that such work would not be undertaken during or before rainfall and high winds where practicable. Such work will only be carried out by competent personnel using products approved for UK use with adherence to manufacturer's instructions; and

k. The WMP (which will be produced post consent with the detailed CEMP) 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

9.6.12 The measures outlined below will be implemented to manage the risk of accidental spillages within the Site and potential conveyance to nearby water features via surface runoff or land drains. These measures are secured in the **Framework CEMP [EN010143/APP/7.7]** and will be adopted during the construction works:

a. Fuel will be stored and used in accordance with the Control of Substances Hazardous to Health Regulations 2002 (Ref. 9-85), 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;

b. 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, which includes 10% more capacity than is needed);

c. Any plant, machinery or vehicles will be inspected before every use 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 practicable or, if on site, only at designated areas within the Scheme site compound. Only construction equipment and vehicles free of all oil/fuel leaks will be permitted on the Site. Drip trays will be placed below static mechanical plant;

d. All washing down of vehicles and equipment will take place in designated areas and wash water will be prevented from passing untreated into watercourses;

e. All refuelling, oiling and greasing of plant will take place above drip trays or plant nappies, 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;

f. As far as reasonably practicable, only biodegradable hydraulic oils will be used in equipment working in or over watercourses;

g. All fixed plant used on the Site will be self-bunded;

h. Mobile plant is to be in good working order, kept clean, fitted with plant ‘nappies’ at all times and are to carry spill kits;

i. The WMP (which will be produced post consent) will include details for pollution prevention and will be prepared and included alongside the final detailed CEMP. Spill kits and oil absorbent material will be carried by mobile plant and located at high-risk locations across the Site and regularly monitored and topped up. All construction workers will receive spill response training and tool box talks;

j. The Site will be secure to prevent any vandalism that could lead to a pollution incident;

k. Construction waste/debris are to be prevented from entering any surface water drainage or water body;

l. 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;

m. Where practicable concrete mixing and washing down of mixing plant is to be carried out by the suppliers and away from the Site. Should on-site concrete washout be required, suitable facilities (e.g. geotextile wrapped sealed skip placed within a bunded area or specialist mobile concrete washout facility) will be provided to ensure that the high alkalinity wash water is adequately contained and prevented from entering surface or groundwater. Wash water will be removed from the Site for appropriate disposal at a suitably licenced waste facility.

Concrete washout is prohibited within a minimum of 10 m of any body of water, including ditches and ponds, or surface water drains, and within 5 m of a foul drain; and

n. 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. Full monitoring details would be outlined in the detailed CEMP.

9.6.13 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.

Management of Flood Risk

9.6.14 The **Framework CEMP [EN010143/APP/7.7]** will incorporate measures to prevent an increase in flood risk during the construction works, in addition to the provision of temporary settlement and drainage measures as detailed above.

9.6.15 Construction works undertaken adjacent to, beneath and within watercourses will comply with relevant guidance, including Environment Agency and other guidance documents (e.g. GPP 5: Works and maintenance in or near water).

a. The Framework CEMP will incorporate measures aimed at preventing an increase in flood risk during the construction works. Example of measures that would be implemented include:

b. Topsoil and other construction materials would be stored outside of the 0.5% AEP extent for areas at tidal flood risk and outside of the 1% AEP extent for areas at fluvial flood risk. If areas located within Flood Zone 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;

c. Connectivity would be maintained between the floodplain and the adjacent watercourses, with no changes in ground levels within the floodplain as far as practicable;

d. During the construction phase, the Contractor would monitor the weather forecasts daily, and review the weekly and monthly weather forecasts each week, and plan works accordingly. For example, works in the channel of any watercourses would be avoided or halted were there to be a significant risk of high flows or flooding; and

e. The UK Government's Flood Warning Service issues flood warnings and alerts to registered users, with users able to specify the areas for which they require warnings and alerts. Key contractor personnel (to be identified within the detailed CEMP) would be registered with the service and would be responsible for ensuring this information was disseminated and the Emergency Response Plan (see below) was followed.

9.6.16 The Contractor would be required to produce an Emergency Response Plan as part of the detailed CEMP (secured through the DCO) which would provide detail of the response to an impending flood event and include:

a. A 24-hour ability to mobilise staff in the event of a flood warning;

b. 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;

c. Details of the evacuation and site closedown procedures;

d. Arrangements for removing any potentially hazardous material and implement more stringent protection measures;

e. If water is encountered during below ground construction, suitable de-watering methods would be used. Any groundwater dewatering required in excess of the exemption thresholds would be undertaken in line with the requirements of the Environment Agency (under the Water Resources Act 1991 as amended) (Ref. 9-6) and the Environmental Permitting Regulations (2016) (Ref. 9-10); and

f. Safe egress 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 Cable and Interconnecting Cables: Trenchless Crossings – River Ouse, River Derwent, Featherbed Drain (Horizontal Directional Drill)

9.6.17 It is proposed to install the grid connection cable beneath the Rivers Ouse, River Derwent, an unnamed drain adjacent to the River Derwent (named by the Scheme as DE53) and Loftsome Bridge Drain close to the A63, plus medium voltage cable below Featherbed Drain using underground techniques such as horizontal directional drilling beneath the bed of the channel (refer to **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]** for locations).

9.6.18 The cable would be installed a minimum of 5 m beneath the bed in the case of the River Ouse and River Derwent , and a minimum of 1.5 m below bed for the Featherbed Drain, Loftsome Bridge Drain and the unnamed watercourse (DE53). A maximum depth would be finalised based on site specific risk assessment at each crossing location in order to minimise groundwater interactions where practicable. Information will be sought from the Environment Agency on the construction details of the flood defence embankments that may need to be crossed. This will inform the approach for directional drilling beneath the Rivers Ouse and Derwent and associated flood defences. There will be a minimum 16m buffer between HDD send or receive pits from the landward toe of flood defences, see **Figure 9-2, ES Volume 3 [EN010143/APP/6.3]**.

9.6.19 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 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 will not be spilt into the channel when working close to the banks of a watercourse. Delivery of a hydraulic fracture risk assessment is provided for in the Framework CEMP. The **Framework CEMP** is included in in the DCO application **[EN010143/APP/7.7])** and is secured through a requirement of the DCO.

9.6.20 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.

9.6.21 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.

9.6.22 The bentonite within the drilling fluid enables the fluid to have sufficient viscosity to carry the cutting chips back to the surface machine whilst lubricating and cooling the drilling bit. The drilling fluid that returns to the drilling rig would be recycled within that drilling rig. Any wastewater/drilling products that are not recycled will be stored and removed from the Site by a suitable waste management contractor and disposed of at a licenced wastewater facility.

9.6.23 The sections of the cables that will be installed via trenchless approaches will require send and receive pits to be installed at each crossing point. These are identified in **Figure 9-3, ES Volume 3**. The send and receive pit excavations for drilling/boring will be located at least 10 m from the watercourse edge, as measured from the top of bank (or 16 m from the landward toe of flood defences). This may require survey work (prior to construction) in some locations to adequately define and agree the top of bank position.

9.6.24 The exact dimensions of the send and receive pits would be determined by site and ground conditions but will be kept to a safe minimum in terms of length, width and depth. Maximum parameters considered here as a worst case are dimensions of 8 m length x 4 m width x 1 m depth. A shoring system appropriate to the ground conditions will be used as appropriate to minimise water ingress into the pits. To be chosen based on suitability for the site conditions by the specialist contractor. 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.

9.6.25 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.

Grid Connection Cable, Interconnecting Cables and On-site Electrical Cabling: Management of Risk to Morphology of Watercourses

9.6.26 The Grid Connection Cable, Interconnecting Cable and Onsite Electrical Cabling watercourse crossings (aside from the River Ouse, River Derwent, Featherbed Drain, unnamed drain DE53 and Loftsome Bridge Drain) are assumed to use intrusive open-cut techniques for cable installation.

9.6.27 In total, there are expected to be 36 open-cut watercourse crossings (11 for the Grid Connection Cable and 25 for either the On-site electrical cabling or Interconnecting Cabling) as outlined in **Table 9-17**.

Table 9-17. Open-cut Crossings for Grid Connection Corridor and Onsite Electrical Cabling/Interconnecting Cabling

Grid Connection Cable: Indicative Open-Cut Watercourse	Approximate NGR	Onsite Electrical Cabling / Interconnecting Cables: Indicative Open-Cut Watercourse	Approximate NGR
OU20	SE 67166 28012	Burtles and Highfield Drain	SE 73849 36013
Alternate OU20	SE 67272 28205	Clay Bowdales Drain	SE 73951 35866
OU24	SE 67499 28456	Sewer Drain	SE 75270 35233
OU27	SE 67037 27442	Londesborough Drain	SE 77403 34823
DE03	SE 68583 28939	Hall Dyke	SE 76073 32757
DE52	SE 69050 29165	Hall Dyke	SE 76140 32444
FL05	SE 72825 31733	New Drain	SE 76173 32237
FL09	SE 74049 33464	Bishopsoil Drain	SE 76611 31480
FL07	SE 74457 34005	Bishopsoil Drain	SE 76768 31500
FL08	SE 74466 34008	F001	SE 77890 31417
Fleet Dike	SE 73418 32679	FL05	SE 73795 33078
		FL13	SE 72996 33519
		FL18	SE 72999 33518
		FL19	SE 72966 33639
		FO53	SE 74090 32551
		FO54	SE 75301 33306

Grid Connection Cable: Indicative Open-Cut Watercourse	Approximate NGR	Onsite Electrical Cabling / Interconnecting Cables: Indicative Open-Cut Watercourse	Approximate NGR
		FO55	SE 74872 33720
		FO63	SE 74932 35513
		FO74	SE 75295 35160
		FO76	SE 76612 34349
		FO76	SE 76410 34584
		FO77	SE 76092 34840
		FO78	SE 77696 34333
		FO78	SE 77384 34135
		DE57	SE 73869 35874

9.6.28 This will be subject to further refinement of the Scheme design post-consent and the number of crossings will be minimised where practicable. With the exception of one crossing of the WFD designated Fleet Dike, these are all agricultural drains, and the indicative locations are shown in **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**.

9.6.29 A pre-works morphology survey of the channel of each watercourse to be crossed will be undertaken prior to construction. This would be within the area to be crossed as determined at detailed design. 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.

9.6.30 At this stage it is assumed that where open-cut crossings are required water flow would be maintained by damming and over-pumping or fluming. Works will be carried out in the drier months where practicable as this would reduce the risk of pollution propagating downstream, particularly in the case of ephemeral watercourses. Once the watercourses are reinstated, silt fences, geotextile matting, or straw bales will 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 secured in the WMP (via the **Framework CEMP [EN010143/APP/7.7]**).

Access Track Crossings of Watercourses

9.6.31 Access tracks will be constructed across the Solar PV Site. These will typically be 6 m wide (with passing places) compacted stone tracks (Type 1 aggregate) over appropriate geotextile with gradient slopes on either side (where required). They will adhere to the appropriate 10 m buffer from watercourses and ponds as outlined above (30 m in the case of the River Ouse, River Derwent and unnamed drain DE53), except where crossings are required.

The Scheme layout has been designed to avoid new drainage ditch and watercourse crossings where practicable. **Table 9-18** shows the 25 required crossings within the Solar PV Site that have been identified for access tracks, and of these eight are new crossings. The indicative locations are also shown in **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**.

Table 9-18. Access Track Crossings

Access Track Crossing	Approximate NGR	New or Existing Crossing
Burtles and Highfield Drain	SE 73842 36034	Existing
Burtles and Highfield Drain	SE 73906 35915	New
Clay Bowdales Drain	SE 73951 35866	Existing
Sewer Drain	SE 75281 35233	Existing
Londesborough Drain	SE 77403 34823	Existing
Hall Dyke	SE 76085 32724	New
Bishopsoil Drain	SE 76768 31500	Existing
Black Dyke	SE 72045 30293	Existing
Black Dyke	SE 72514 29932	Existing
Black Dyke	SE 72531 29838	Existing
F001	SE 77890 31417	Existing
FL05	SE 73006 31983	Existing
FL13	SE 72996 33519	Existing
FL18	SE 72999 33518	Existing
FL19	SE 72966 33639	New
F053	SE 74090 32551	Existing
F054	SE 75301 33306	Existing
FO55	SE 74872 33720	New
FO63	SE 74941 35491	Existing
FO76	SE 76410 34584	New
FO76	SE 76612 34349	New
FO77	SE 76092 34840	New

Access Track Crossing	Approximate NGR	New or Existing Crossing
FO78	SE 77696 34333	Existing
FO78	SE 77289 34084	Existing
DE57	SE 73550 35753	New

9.6.32 Where existing crossings are to be used, it is assumed as a worst case that some degree of strengthening or improvement of the structures may be required (which may require minor widening). Where such upgrades are required, they are assumed to be a maximum extension to the structure width of 2 m. Where a new drainage ditch crossing is required, an open span bridge crossing will be used, with the specific 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 PV Site). Bridge foundations would be set back from the edge of the channel. There would be no new culverts as part of the Scheme, however existing culverts may be extended by up to 2 m with length-for-length equivalent watercourse enhancements required. Tracks will be permeable, and localised SuDS, such as swales and infiltration trenches, will be used to control runoff during construction if required.

9.6.33 Where extensions to existing culverts are required, they will be designed appropriately to maintain connectivity along watercourses for aquatic species and riparian mammals, where these are shown to be present. Where practicable, culverts extensions and any improved structure 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. Length-for-length equivalent watercourse enhancements are required for each new culvert extension, and to ensure compliance against WFD objectives. The requirements will be detailed in a WFD Mitigation and Enhancement Strategy to be produced post DCO consent. This Strategy will be secured through the CEMP with more information regarding the detail that will be contained therein available within **Appendix 9-2 Water Framework Directive Assessment, ES Volume 2 [EN010143/APP/6.2]**.

9.6.34 In addition to these crossings within the Solar PV Site, a temporary open span bridge is to be installed to facilitate the construction of the Grid Connection Corridor on Drain DE53 at NGR SE 69239 29218. Bridge foundations would again be set back from the edge of the channel to ensure continuity of riparian habitat.

9.6.35 Depending on the design of any watercourse crossings, floodplain compensation may also 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 span and soffit height of any works to existing crossings to ensure no increase in flood risk.

Operation

Design

9.6.36 Detailed information on Scheme design and infrastructure is provided in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

9.6.37 All infrastructure will be off set from watercourses by 10 m (except where crossings are required). For small channel watercourses/agricultural drainage channels this would be measured from the top of bank as required by IDBs (confirmed during consultation on 15 March 2023). This will likely require survey which will be undertaken post-consent to reflect the detailed design. For larger watercourses with channel widths typically greater than 3 m (such as the River Ouse and River Derwent), this would be measured from the water's edge / channel extents under normal flow conditions.

9.6.38 Indicative foundation depths associated with the development include typical depths of 3 to 5 m for driving and erection of the Solar PV module mounting structures, typical trench depth of 0.6 to 0.8 m for low voltage On-site cabling (i.e within the Solar PV Site), typical depth of 1.2 to 1.4 m for Interconnecting Cables and the Grid Connection Cables in agricultural land.

9.6.39 Depths of the Grid Connection Substation foundations will depend on specific ground conditions, but are likely to be concrete block foundations of 1 m deep, or screw piles that could potentially reach several metres deep (18 m as a worst case).

Flood Risk Mitigation Requirements

9.6.40 Within Solar PV Area 2a the majority of the solar PV panels and vulnerable electrical components have been sequentially located outside of Flood Zone 3. Where panels are located within Flood Zone 3, the tilt range of the tracker panels will be restricted to ensure that a 300 mm freeboard above the modelled design flood event (1% AEP plus climate change) is maintained at all times regardless of whether there is a flood event occurring or not. Tilt range can be set on a solar PV table by solar PV table basis and therefore will vary across the Flood Zone 3 area. Additionally, if increasing water levels are observed or if a flood warning is received, panels can be remotely moved into their horizontal (night-time storage position) of 2.3 m above ground level, as further described in the **FRA (Appendix 9-3, ES Volume 2).**

9.6.41 To compensate for the approximate 150 m^3 of floodplain volume lost as a result of the Scheme in this parcel, flood compensation is proposed along the edge of Flood Zone 3 in this area to provide this storage. The floodplain compensation indicative area can be seen in **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. The precise location and design of the compensation area will be determined at detailed design. Following decommissioning of the Scheme, the compensation area will be reinstated to a flat field as existing.

9.6.42 Within Solar PV Area 1e the majority of the Solar PV Panels and vulnerable electrical components have been sequentially located outside of Flood Zone 3. The estimated maximum flood depth in Solar PV Area 1e is 1.20 m where there are natural depressions in the ground. The estimated maximum flood level is approximately 4.20m AOD based on this analysis.

9.6.43 As for Solar PV Area 2a, the tilt range of the tracker panels will be restricted to ensure that a 300 mm freeboard above the estimated flood event is maintained at all times. Where depressions are located, the panels will either

traverse the depression and maintain the same minimum panel level as the highest ground level either side or will stop at the depression if it is too wide.

9.6.44 To compensate for the approximate 100 m^3 of floodplain volume lost as a result of the Scheme in Solar PV Area 1e, flood compensation is proposed along the edge of Flood Zone 3 in this area to provide this storage. The floodplain compensation indicative area can be seen in **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. The precise location and design of the compensation area will be determined at detailed design. Following decommissioning of the Scheme, the compensation area will be reinstated to a flat field as existing.

9.6.45 To increase resiliency of the panels in both parcels, including during the 1% AEP H++ event, when a flood warning is issued by the Environment Agency, the panels will be set to their horizontal position where the height above ground level will be 2.20 m. The Site will be monitored 24 hours a day and site inspections will occur daily so operatives will set the panels to the horizontal position if increasing water levels are observed or if a flood warning is received. This can be done remotely from the Operations and Maintenance Hub at Johnson's Farm or by maintenance personnel remotely online from any location.

9.6.46 Field Stations located within Flood Zone 2 and in areas of surface water flood risk will be raised a minimum of 300 mm above the modelled design flood event. The Grid Connection Substations will be located in in Solar PV Area 1c which is Flood Zone 1.

Framework Surface Water Drainage Strategy

9.6.47 A **Framework Surface Water Drainage Strategy, Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** has been developed following consultation with the Ouse and Humber Drainage Board, within whose jurisdiction the Scheme is primarily located (aside from the Grid Connection Corridor). Furthermore, a detailed Surface Water Drainage Strategy will be developed post-consent (following detailed design and the results of infiltration testing) and this will be secured as a requirement of the DCO. The following agreements were made with the Ouse and Humber Drainage Board:

a. The Solar PV Panels will be tracking and will therefore not focus surface water in specific areas (no single drip track). The ground will be raked in line with contours to encourage the retention and infiltration of rainfall until vegetation is established. Maintenance visits will check for signs of developing flow paths and mitigate where necessary. For these reasons, the Solar PV Panels are not considered further by the strategy.

b. Field stations will consist of up to four shipping containers, founded on ground screw piles or strip footings, sitting above ground with gravel or aggregate underneath. This will allow runoff to spread under the units, mitigating an impact from the structures. The units will also be located away from the edge of fields, allowing the surrounding land to further aid in mitigating any runoff. As such, the field stations have not been considered further by the strategy.

c. The operations and maintenance hub at Johnson's Farm will be a small administration area that will refurbish the existing buildings for use or rebuild on the existing building footprint (see Chapter 2: The Scheme,

ES Volume 1 [EN010143/APP/6.1] for further details). No change in the current behaviour of the site is expected. This is generally flat and surrounded by fields that will hold solar panels (to the west) or be retained as land for habitat enhancement (to the east), see Figure 2-3, ES Volume 3 [EN010143/APP/6.3]. Foul drainage will be managed by a septic tank system as previously described. For these reasons, Johnson's Farm is not considered further by the strategy.

d. The two Grid Connection Substations will be contained in a single field (Solar PV Area 1c) and will consist of two areas of hardstanding, access roads, a small parking area and a number of small kiosk buildings. Surface water runoff from this field will have to be managed with flows reduced to the greenfield rate. Therefore, the strategy has considered the Solar PV Area 1c and the Grid Connection Substations.

9.6.48 Solar PV Area 1c is a field (approximately 2.0 ha in area) with no water courses or drains in proximity. The topography of the site is extremely flat with no obvious direction for surface water runoff.

9.6.49 The proposed infrastructure will be at ground level and therefore standing water on the surface of the flat field has the potential to impact it. It also has the potential to flow to neighbouring fields at an increased rate. With no specific route to discharge from the field, the best way to manage these issues is to hold surface water from the proposed development below ground level elsewhere in the field. Therefore, the drainage system needs to contain the entire storm volume.

9.6.50 As part of the **Framework Surface Water Drainage Strategy (Appendix 9-4, ES Volume 2 [EN010143/APP/6.2])**, provisional storage volume requirements for Solar PV Area 1c have been calculated using a 1 in 100year return period to suit the 40-year design life of the Scheme. It has been assumed that the design life of the hardstanding elements in Solar PV Area 1c will be 100 years as they could potentially be reused by another development after the decommissioning phase. An upper end allowance of 40% increase in rainfall has been used (see **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** for further details). Based on an impermeable area of 0.52 ha the maximum required storage attenuation volume is 750 m^3.

9.6.51 Three different sized attenuation storage areas are proposed across Solar PV Area 1c. The first channel is assumed to be 5.0 m wide x 40.0 m long x 1.0 m deep located adjacent to the operations building. The second channel is assumed to be 6.0 m wide x 30.0 m long x 1.0 m deep located adjacent to the south-eastern access track between the primary 132kV switchrooms. The final channel is assumed to be 10.0 m wide x 25.0 long x 1.5 m deep located at the north-eastern corner of Solar PV Area 1c. See **Plate 9-4** for the approximate location of attenuation storage areas in Solar PV Area 1c. Note that these locations may change if the design of the Grid Connection Substations develops post consent. Such changes will be captured in the detailed Surface Water Drainage strategy to be prepared prior to construction, as secured through the DCO.

9.6.52 The infrastructure to collect water and carry it to the storage areas will also be developed as the layout design of the Grid Connection Substations progresses at the detailed design stage (post-consent).

9.6.53 The system is designed to contain the 100-year (+ climate change) design event. For larger storms, the surface flow will be allowed to leave the field in all directions and will infiltrate or ultimately drain to three possible drains: Wilitoft Drain, Fleet Dike Two and Londesborough Drain. This still represents an improvement of the current site runoff because there will be no flow from the site until the attenuation is full. Therefore, only the later stages of extreme rainfall (larger than the 100-year event) will give rise to surface flow leaving the site.

9.6.54 Infiltration testing has not yet taken place on this site and therefore an infiltration rate of 0.0 m/h (nil) has been assumed when calculating the storage sizes. The detailed strategy provided post-consent will be further informed by infiltration testing.

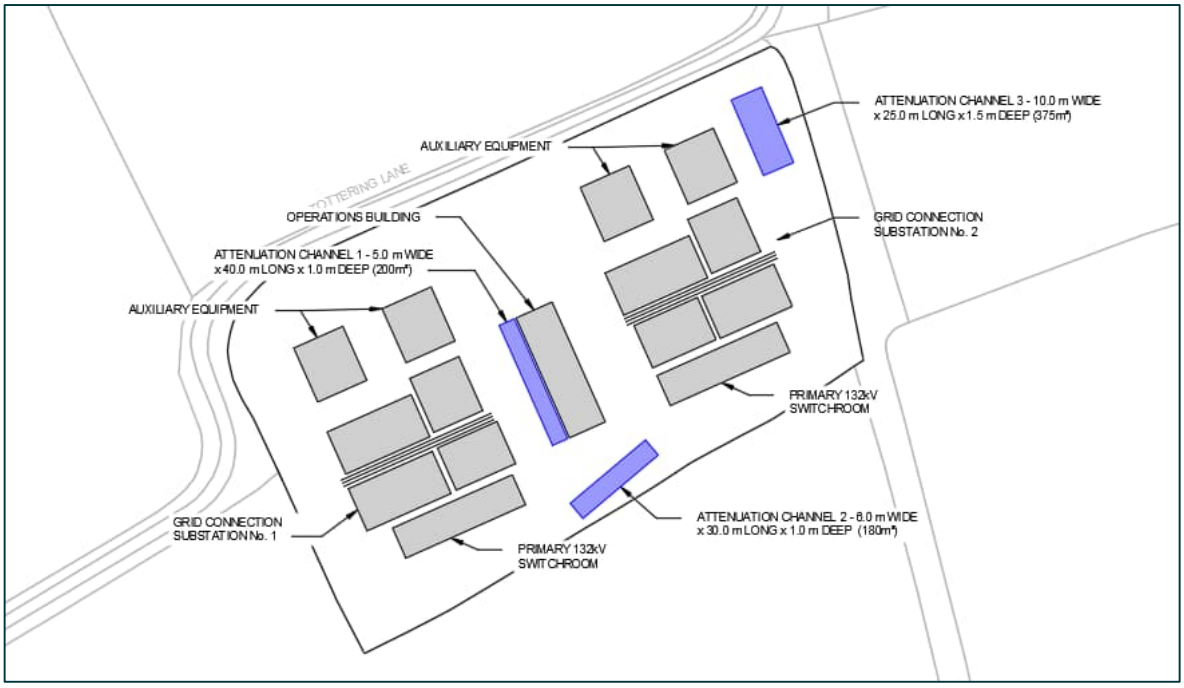

Plate 9-4. Indicative Location of Attenuation Storage

Operational Cleaning

9.6.55 Operational panel cleaning would be undertaken using a truck mounted system with a rotating 'car-wash' type brush. It is anticipated that water would be brought to site in 1 m^3 IBCs. Individual IBCs would be mounted on the rear of the tractor to provide water supply during cleaning. Based upon cleaning water usage on similar schemes it is estimated that the cleaning of each panel will require 250 ml of water and that, assuming cleaning of all panels is required, the total volume of cleaning water per cleaning cycle would be 206 m^3. A 2-year cleaning cycle is assumed as a worst case.

9.6.56 As the use of cleaning products can damage panels and void manufacturer's warranties, no cleaning products will be used, only water.

9.6.57 The operator of the Site will be required to source water from a suitable source for ongoing requirements for panel cleaning. This may involve purchasing water when needed from a suitable third-party provider.

Weed Control

9.6.58 With regard to weed management, the Applicant has identified options for the management of the grassland created within the solar farm. This includes management by grazing or by mowing/strimming.

9.6.59 Where mowing/strimming is required, as a worst case there may be localised use of herbicide or other spray chemical in small volumes. This is not a planned operation of the Scheme, but the occasional use during the 40-year lifetime of the Scheme cannot be ruled out. Should this be required, a method statement, operating procedure or similar will be prepared prior to the work commencing, this will include measures to protect ground and surface water, including working in dry weather and not in high winds, and maintaining appropriate buffers from watercourses. Application of chemicals would only be carried out by suitably competent personnel using products approved for UK use with adherence to manufacturer's instructions. This mitigation is secured through the **Framework Operational Environmental Management Plan (OEMP) [EN010143/APP/7.8]**.

Permits and consents

9.6.60 Various water-related permissions may be required where it is not agreed with the relevant regulating authority to disapply them through the DCO. The requirement for these consents and permits is explained in the **Consents and Agreements Position Statement [EN010143/APP/3.3]**. These permissions may include:

a. Land drainage consent(s) under section 23 of the Land Drainage Act 1991 (Ref. 9-5) for works affecting the flow in ordinary watercourses;

b. Flood risk activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 (Ref. 9-10) in connection with drainage outfall installation;

c. Water activity permit(s) from the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 (Ref. 9-10) for temporary construction and permanent operational discharges;

d. Trade effluent consent under the Water Industry Act 1991 () for the purposes of discharging trade effluent from welfare facilities during construction;

e. Full or temporary water abstraction licence(s) under section 24 of the Water Resources Act 1991 (Ref. 9-6) (if more than 20 m3/d is to be dewatered / over-pumped and exemptions do not apply) – see further detail below;

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

g. Canal and River Trust consent (as Navigation and Harbour Authority) for laying of cables beneath the River Ouse; and

h. Under IDB byelaws, prior written consent (outside of the planning process) is needed for certain works that may affect IDB watercourses such as any works within the channel or any drainage into an IDB watercourse.

9.6.61 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 send and receive pits associated with the HDD crossings or other excavations where groundwater may be encountered, other than where exemptions apply. A full licence is required when more than 20 m^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 20 m^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 if this is not included for in the DCO to discharge the water to ground or a watercourse if the water is considered to be 'unclean'.

Monitoring

9.6.62 The WMP (to be produced post-consent) will set out details of water quality monitoring to be undertaken during construction. Due to the low 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 [EN010143/APP/7.7]**. No water quality monitoring is required during the operational period. It is anticipated that water quality monitoring would be required during the decommissioning phase, this will be defined in the detailed DEMP (as secured through the **Framework DEMP [EN/010143/APP/7.9]** which is provided as part of the DCO Application).

9.7 Assessment of Likely Impacts and Effects

Construction Effects (assumed 2025 – 2027)

9.7.1 The Scheme as outlined in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**, has been assessed to determine the likely impacts and effects on the water environment, whilst considering the embedded mitigation described in section 9.6. The assessment has been undertaken following the methodology as detailed in section 9.4 of this Chapter.

9.7.2 During construction the following adverse impacts on the water environment may occur:

a. Pollution of surface water or groundwater (and any designated ecology sites that are water dependent) due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site run-off including dewatering of excavations or piling;

b. Temporary impacts on the hydromorphology of watercourses from open-cut watercourse crossings or temporary vehicle access as may be required;

c. Temporary changes in flood risk from changes in surface water runoff (e.g. disruption of stream flows during any potential culvert construction works) and exacerbation of localised flooding, due to deposition of silt, sediment in drains, ditches; and

d. Potential impacts on groundwater resources and local water supplies (licenced and unlicenced abstractions) and potentially the baseflow to watercourses from temporary dewatering of excavations or changes in hydrology.

9.7.3 Likely significant effects are summarised in **Table 9-20** at the end of section 9.7, with discussion presented below in the following paragraphs.

Solar PV Site Study Area

Surface Water Features – Water Quality

9.7.4 The Solar PV Site is located to the east of the River Derwent and extends between the Fleet Dike and the River Foulness WFD waterbodies. A crossing of the Fleet Dike WFD watercourse is required for the Grid Connection Cables and there would be numerous crossings of the various drains and ditches that are ubiquitous across this agricultural area for Interconnecting Cables, on site electrical cables, and for access tracks (as outlined in section 9.6).

9.7.5 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 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.

9.7.6 Construction works within, along the banks of, 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.

9.7.7 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).

9.7.8 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 water features directly. Like excessive fine sediment in construction site runoff, the risk is greatest where works occur close to and within water features.

9.7.9 The majority of construction works across the Solar PV Site are set back 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.

9.7.10 As stated in the assumptions (section 9.4), it is currently assumed that with the exception of Featherbed Drain (for which there are local constraints) that all watercourses that need to be crossed by cabling will be done so using open cut, intrusive techniques. These crossings are all of the ditches and drains which are ubiquitous across the area (crossings outlined in **Table 9-17**), and there are 25 locations in total. This is a precautionary, worst-case assumption for the purposes of this assessment, while final crossing

approaches will be informed by site specific conditions. Where these crossings are required, there would be unavoidable works within the channel, with potential for adverse water quality impacts.

9.7.11 Featherbed Drain will be crossed using a trenchless approach (i.e. HDD). The send and receiving pits would be no closer than 10 m from the water's/channel edge (although are at a greater distance on the indicative design shown in **Figure 9-2, ES Volume 3**). 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 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 that will be produced as part of the detailed CEMP after consent and prior to construction. Given the non-intrusive nature of the works and the mitigation that will be in place, the risk to water quality of Featherbed Drain is considered negligible.

9.7.12 With regard to access tracks, a total of 25 crossings are required across the Solar PV Site. Of these, eight are new crossings with 17 already being in place for use by agricultural vehicles. All new watercourse crossings would be open span, and no new culvert structures will be created. However, where there are existing culvert crossings, it is assumed, as a worst case, that these will each require an extension of up to 2 m. Where these culvert extensions are required there would clearly be an unavoidable need to work directly within the watercourse channel in each case. For the open span crossings there would be a need for installation of foundations and abutments in close proximity to each watercourse, which could also cause mobilisation of sediments or accidental spillages if not mitigated. However, best practice mitigation measures as outlined in the detailed CEMP and WMP would be implemented.

9.7.13 In many cases, the agricultural ditches and drains that are likely to be affected by the proposed works across the Solar PV Site are ephemeral/intermittently flowing and when visited on site in November 2022 they were dry in many cases or had ponded standing water that was not flowing. Nevertheless, some of these drains are known to carry significant amounts of water at certain times of the year, and so when flowing there is potential for adverse water quality impacts from runoff containing fine sediments and chemical spillages relating to use of plant adjacent to and within the watercourses. To mitigate this, works will be carried out in the drier months where practicable 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 cable or structure installation, with reconnection only made once the works are complete. Once the watercourses are reinstated, silt fences, geotextile matting, or straw bales will 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 cable or structure crossing and water quality monitoring will be undertaken

prior to, during, and following on from the construction activity. These requirements will be defined in the WMP.

9.7.14 Given the limited potential for conveyance in many of these 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, local and minor, with no impact to downstream receptors (e.g. the River Derwent, River Ouse, Birk Lane Drain or downstream designated sites) from installation of the Interconnecting Cabling and On-site Cabling or access track crossings across the Solar PV Site.

9.7.15 Aside from direct works for watercourse crossings described above, the Scheme design includes a 10 m buffer around all watercourses and ponds, and so for the majority of the Site there is no need to work in immediate proximity to watercourses or ponds.

9.7.16 For the watercourses directly impacted by construction works a temporary and **minor adverse** impact to water quality would be anticipated given the mitigation that is proposed. For the **low importance** (for water quality) agricultural drains and ditches across the Solar PV Site this would result in a **neutral effect (not significant)**.

9.7.17 For the remainder of watercourses that are not directly worked on (including where open span crossings are required), the impact on water quality would be **negligible** given the mitigation measures proposed. For the **high importance** (for water quality) River Foulness and Fleet Dike this results in a **slight adverse effect (not significant)**. For the **low importance** (for water quality) agricultural drains and ditches across the Solar PV Site this would result in a **negligible effect (not significant)**. The installation of Interconnecting Cables beneath Featherbed Drain would also have **negligible impact**, resulting in a **neutral effect (not significant)** for this **low importance** (for water quality) watercourse. Furthermore, there would be no significant effects on potential downstream receptors including the Lower Derwent Valley SAC, SPA, NNR and Ramsar site, the Breighton Meadows SSSI or Derwent Ings SSSI.

Surface Water Features – Morphology

9.7.18 The open-cut installation of the Interconnecting Cables and On-site Electrical Cabling at 25 locations (as indicated in **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**, including the WFD reportable Fleet Dike watercourse, will require intrusive works across drains and ditches. Similarly, as a worst case it is assumed that there will be requirement for 17 culvert extensions for access tracks (assumed 2 m extension in each case) and eight clear span crossings. The affected watercourses across the Solar PV Site are all considered **low importance** for morphology given that they are generally artificially straight, trapezoidal channels lacking significant geomorphic and bedform features.

9.7.19 Where open-cut crossings are required, a pre-works morphological survey will be undertaken at each crossing point. The cables will be buried at sufficient depth to prevent exposure (minimum 1.5 m below the bed) 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.

9.7.20 Any proposed culvert extensions will also require intrusive works and physical impact to watercourses. There would be unavoidable direct loss of riparian, bank and bed habitats for up to 2 m length per watercourse. Such structures can hamper movement of mammals and interrupt continuity of the natural hydraulic and sediment regimes. However, the design will aim to be environmentally sensitive where practicable with a sunken bed and provisions made for mammal passage where appropriate. There will be localised shading effects to the watercourse bed habitat. This reduces light intensity, photosynthesis, metabolic activity, and biochemical cycling within the watercourse, thereby impacting on the aquatic ecosystem, albeit for a short length for each crossing. As such, an equivalent length of watercourse enhancement will be delivered for every metre of watercourse lost to a culvert extension, with this enhancement to be defined within a WFD Mitigation and Enhancement Strategy produced post DCO consent and secured through the CEMP. More information regarding the detail that will be contained in the document is presented in **Appendix 9-2 Water Framework Directive Assessment, ES Volume 2 [EN010143/APP/6.2]**. It should also be noted that existing culverted crossings may in some cases lack hydraulic connectivity through the structure and be in a poor state of repair, and so upgrades to structures may lead to improvements to the affected watercourse.

9.7.21 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 culvert extensions for access tracks and drainage outfalls. As low importance receptors (for morphology) this results in a **slight adverse effect (not significant)** in all cases. This effect would be minimal at the scale of the wider WFD waterbodies once installation of the cables and reinstatement of the watercourse is complete and watercourse enhancement implemented following construction.

Groundwater

9.7.22 As indicated in section 9.6 (and discussed in detail in **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**) the low voltage On-site cabling is required to connect the solar PV panels through various components finally connecting to the switchgear at the Field Stations This cabling requires trenches of around 0.6 to 0.8 m depth within the Solar PV Site. Trench depths for the medium voltage Interconnecting Cables which are required to connect the Field Stations to the Grid Connection Substations are expected to be between 0.8 m and 1.4 m unless there are watercourse crossings or existing services or other obstacles requiring a greater depth.). Other structures within the subsurface include the galvanised steel poles to support the PV Mounting Structures. The depth of installation of these poles will a minimum of 3 m (typically 3 to 5 m) depending on ground conditions. There may also be shallow foundations of 1 to 2 m associated with the hardstanding areas of the Site, for example for the Field Substations/ Field Station Units. For the Grid Connection Substations foundations in Solar PV Area 1c foundations will depend on

specific ground conditions, but as worst case may use screw piles of up to 18 m depth.

9.7.23 There is limited groundwater level data across the Site however there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface at times. Therefore, groundwater in the superficial deposits may be encountered during construction.

9.7.24 Groundwater in the Sherwood Sandstone Principal Aquifer is estimated to be at least 5 m below surface based on Environment Agency monitoring data and topographic elevation and likely to be confined by overlying clay deposits. Groundwater may be encountered where deeper foundations are required (i.e. piling for the Grid Connection Substations) that are installed through the superficial deposits into the bedrock although the spatial extent of these would be very limited in the context of the wider aquifer.

9.7.25 The largely clayey superficial deposits with low permeability would not enable significant groundwater flows. As such, given that no continuous foundations are present in the design, the regularly spaced discrete Solar PV Panel foundations and shallow cabling trenches are considered to have negligible impact on groundwater flow, thereby giving a **neutral effect (not significant)**.

9.7.26 Deeper foundations in the Sherwood Sandstone are not anticipated to impede groundwater flow due to the high permeability and laterally extensive nature of the aquifer compared to the extent of the foundations. Deeper foundations in areas where superficial deposits are underlain by Mercia Mudstone are not expected to encounter significant quantities of groundwater due to the low permeability nature of the secondary aquifer.

9.7.27 The magnitude of impact on groundwater flows is therefore predicted as no change. As the importance of receptor is classified as high for the Sherwood Sandstone aquifer and medium for Mercia Mudstone, this is assessed to result in a **neutral effect (not significant)** in all cases.

9.7.28 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 aquifers. Therefore, the works are considered to have a negligible impact on groundwater flow for the high importance Sherwood Sandstone aquifer and medium importance Mercia Mudstone and superficial aquifers, thereby resulting in a **slight and neutral effect (not significant)** respectively.

9.7.29 In terms of water resources, two PWS have been identified in the vicinity of the Solar PV Site to the south of Solar PV Area 1d (see **Figure 9-1: Surface Water Features and their Attributes, ES Volume 3 [EN010143/APP/6.3]**). Both are currently listed as unused and do not fall within the Order limits. There are no SPZ within the Solar PV Site, and only a small area of SPZ 1 – Inner Catchment, located near Blackwood Hall Farms at the western extent of the Study Area from Solar PV Area 1a. As no change is expected to occur to groundwater levels and therefore groundwater abstractions, there would be a **neutral effect (not significant)** to the unused PWS and to the SPZ in the Study Area.

9.7.30 Construction works to install cables beneath Featherbed Drain (HDD 1 on **Figure 9-2, ES Volume 3 [EN010143/APP/6.3])** and the railway require trenchless installation using drilling or boring techniques. This would require

a temporary send and receive pit either side of the watercourse (greater than 10 m measured from the water's/channel edge under normal flows and subject to survey). Maximum parameters for the pit dimensions are 8 m length x 5 m width x 1 m depth as a worst case.

9.7.31 As outlined above there may be shallow groundwater in parts of the Solar PV Site, 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. Significant groundwater ingress is not anticipated due to the largely clayey, low permeability superficial geology into which the pits would be excavated.

9.7.32 A temporary abstraction licence will be required from the Environment Agency if abstraction of more than 20 m^3/day of water, lasting less than 28 days, is required. Any discharge of groundwater to watercourses 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' (Ref. 9-87) cannot be met.

9.7.33 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 [EN010143/APP/7.7]**, there is potential for a short term, temporary minor adverse impacts on groundwater flow. For the high importance Sherwood Sandstone aquifer this results in a **slight effect (not significant)**. For the medium importance Mercia Mudstone and superficial aquifers this results in a **neutral effect (not significant)**.

9.7.34 The Solar PV Areas are not known to have a significant history of potentially contaminating land uses, although there is a historic landfill site (Breighton Landfill, closed in 1992) situated north of Solar PV Area 2a. Further details are available in **Chapter 16: Other Environmental Topics ES Volume 1 [EN010143/APP/6.1]** and **Phase 1 PRA Report, Appendix 16-2, ES Volume 2 [EN010143/APP/6.2]**.

9.7.35 The installation of the module structures to a maximum depth of 3 to 5 m below ground, and other foundations depths as outlined above (maximum 2 m 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, and similarly appropriate risk assessment would be undertaken for any piling that is required (e.g. for the Grid Connection Substation). This, along with standard measures for protection of groundwater quality, will be secured through the **Framework CEMP [EN010143/APP/7.7]**. Consequently, there would be negligible water quality impact to groundwater aquifers. For the high importance Sherwood Sandstone aquifer this results in a **slight adverse effect (not significant)**. For the medium importance Mercia Mudstone and superficial aquifers this results in a **neutral effect (not significant)**.

9.7.36 Furthermore, there is considered to be no change to water quality of rivers receiving baseflow, and groundwater abstractions down gradient. This results in a **neutral effect (not significant)** in both cases.

Flood Risk

9.7.37 An **FRA** is included in **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**. A summary of flood risk to the Solar PV Site is outlined below.

Fluvial and Tidal Flood Risk

9.7.38 The majority of the Solar PV Site study area is in Flood Zone 1 (see **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**) and considered to be at low risk from fluvial and tidal flooding. However, construction activity in Solar PV Area 1e and 2a 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.

9.7.39 With the implementation of standard construction methods and mitigation as described in section 9.6, this fluvial flood risk can be effectively managed through a variety of measures, 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. An Emergency Response Plan would also be in place and is secured within the **Framework CEMP [EN010143/APP/7.7]**.

9.7.40 As such, the magnitude of flooding from these sources during construction, both on site and further downstream to off-site receptors, is considered to be very low resulting in a negligible impact. When considering the construction workers on site who are a very high importance receptor, this gives a **slight adverse effect (not significant).**

Surface Water (Pluvial) Flood Risk

9.7.41 The Solar PV Site 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 **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**.

9.7.42 During construction, the following adverse impacts may occur with regard to surface water flood risk:

a. 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;

b. 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

c. Changes in flood risk due to the construction of Solar PV Site and site compound and storage facilities, which alter the surface water runoff from the site.

9.7.43 Construction activities will take place with the Final CEMP in place (building on the **Framework CEMP [EN010143/APP/7.7]**) to ensure no exacerbation of localised flooding from deposition of silt or sediment in drainage and ditches. A temporary drainage system will be in use where required (see Section 9.6).

9.7.44 Therefore, the impact during construction on surface water flooding and flood risk, to and from the Scheme and to other developments and receptors outside of the Scheme extents, is considered to be negligible. For the **very high importance** construction workers this would be a **slight adverse effect** in EIA terms (**not significant**).

Flood Risk from Groundwater

9.7.45 The British Geological Survey (BGS) Groundwater Flood Map (Ref. 9-48) shows that the majority of the Solar PV Site study area is not within an area where there is potential for groundwater flooding to occur, with few isolated areas where there is potential for groundwater flooding to occur at the surface. There are areas to the south, near North Howden, and to the north and east, towards Spaldington and along the River Foulness, located in areas shown to be slightly more susceptible to groundwater flooding (25-50% and 50-70% susceptibility). It is considered that groundwater flood risk both to and from the site is unlikely to increase from the Solar PV Site study area during construction as the majority of works will be above the ground surface with relatively limited excavations. Infiltration into the soil and underlying geology will remain largely as per existing conditions except for localised areas of hardstanding (most notably in Solar PV Area 1c) and temporary drainage systems will be used where necessary as per the **Framework CEMP [EN010143/APP/7.7]**.

9.7.46 Based on the above considerations, the impact during construction on groundwater flooding and flood risk, to and from the Scheme to other developments and receptors outside of the Order limits, is considered to be negligible. When considering the very high importance receptors, being the construction workers, this results in a **slight adverse effect (not significant)**.

Flood Risk from Sewers and Artificial Sources

9.7.47 The Solar PV Site study area is considered to be at low risk of flooding from artificial sources and sewers.

9.7.48 It is not envisaged the flood risk from drainage infrastructure (e.g. sewers) will increase from the baseline situation with the construction of the Scheme. No new connections to foul water infrastructure are considered to be required for the Scheme.

9.7.49 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 receptors). In terms of very high importance construction workers there is a **neutral effect (not significant)** from flood risk from drainage infrastructure and artificial sources.

Grid Connection Corridor

Surface Water Quality Impacts

9.7.50 The Grid Connection Corridor spans the 'Derwent from Elvington Beck to River Ouse', 'Ouse from R Wharfe to Upper Humber' and Fleet Dike WFD waterbody catchments, within which there are a number of watercourses that will require crossing.

9.7.51 The Grid Connection will be constructed beneath the channels of the Rivers Derwent and Ouse (HDD 3 and HDD 6, **Figure 9-2, and Figure 2-4, ES Volume 3**). There would also be trenchless crossings of the unnamed drain DE53 (HDD 5) and Loftsome Bridge Drain (HDD 4). Drilling techniques are proposed to be used which would not disturb the watercourse bed or the flood defences associated with the Rivers Ouse and Derwent. However, as previously described for Featherbed Drain (HDD 1), send and receive pits would be required for drilling (no closer than 10 m from the water's/channel edge, or 16 m from the landward toe of flood defences) and there would be a need for plant movements in the vicinity of the channel during construction. 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 appropriately. 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 spillage or other pollution is identified. These mitigation requirements will be outlined in a WMP, as secured in the **Framework CEMP [EN010143/APP/7.7]**.

9.7.52 Given the scale of the Rivers Ouse and Derwent and therefore their large dilution and dispersal capacity, as well as the non-intrusive nature of the works and the embedded mitigation, the risk to water quality during cable installation beneath the bed is considered negligible. For these very high importance receptors (for water quality), a negligible magnitude of impact results in a **slight adverse effect (not significant)**. Consequently, there would be no adverse water quality impact on the River Derwent SSSI or SAC, nor on the downstream Humber Estuary SAC, SSSI, SPA and Ramsar site.

9.7.53 For the smaller scale Unnamed drain DE53 and Loftsome Bridge Drain, it is also considered that impacts would be negligible from installation of trenchless crossings given the measures outlined in **Framework CEMP [EN010143/APP/7.7]** combined with that fact that no direct works to the channels are required. A temporary open-span bridge over drain DE53 for construction access would have set back abutments, and provided that the measures outlined in **Framework CEMP [EN010143/APP/7.7]** are followed impacts would again be considered negligible. For these low importance receptors (for water quality) this results in a **neutral effect (not significant)**.

9.7.54 There are currently anticipated to be 11 intrusive crossings of agricultural drains and ditches (including the WFD designated Fleet Dike) which are tributaries of the River Derwent and River Ouse for the Grid Connection (see **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**). The potential impact and mitigation for these crossings will be the same as that described above with regard to the Interconnecting Cables and access tracks within the Solar PV Site and so is not repeated here. Overall, with the proposed mitigation in place, a temporary and minor adverse impact to water quality would be anticipated. For the high importance (for water quality) Fleet Dike this would result in a **slight adverse effect (not significant)**. For the low importance (for water quality) agricultural drains and ditches this would result in a **neutral effect (not significant)**.

9.7.55 Given that no other watercourses or water features will be directly affected by the construction works for the Grid Connection, and that the Site has buffer zones around watercourses and ponds, a no change magnitude of impact is predicted for all other surface water receptors in the Study Area from site runoff and chemical spillages. For the low importance agricultural drainage ditches (those that are not directly crossed) and small ponds, this results in a **neutral effect (not significant)**. Furthermore, given that no significant effects have been identified, it follows that there would be no significant effect to potential downstream receptors including the Lower Derwent Valley SAC, SPA, NNR and Ramsar site, the Breighton Meadows SSSI or Derwent Ings SSSI.

Surface Water Features – Morphology

9.7.56 The requirement for open cut installation of cables through 11 watercourses for the Grid Connection Corridor (as indicated in **Figure 9-2 Drain Names, ES Volume 3 [EN010143/APP/6.3]**) will unavoidably cause short term, temporary adverse impacts on the affected watercourses and their riparian habitats, as well as the hydrological and sediment regimes.

9.7.57 Mitigation will be in place, as per intrusive crossings for the Solar PV Site including a pre-works hydromorphological survey to be undertaken at each crossing point. The cables will be buried at sufficient depth to prevent exposure (minimum 1.5 m below the bed) and the flow over-pumped or flumed during the works to minimise the risk of water pollution being carried downstream. As such, these impacts would be very localised and short in duration, with the channels reinstated taking into account the pre-works morphological condition.

9.7.58 A temporary open-span bridge over Unnamed drain DE53 may cause a localised and temporary adverse impact to the riparian margin of the drain but would not affect the banks or bed morphology given that the abutments would be set back from the channel edge, thus enabling passage of riparian mammals.

9.7.59 Overall, physical works are considered to give a localised moderate adverse impact against hydromorphological status for all open cut cable installation locations. For the worst case moderate adverse impact, given that all affected watercourses are low importance receptors (for morphology) this results in a **slight adverse effect (not significant)** in all cases. For the open span bridge over DE53, any impact would be minor adverse, which for this low importance receptor (for morphology) would result in a **neutral effect (not significant)**. This effect would be minimal at the scale of the wider WFD

waterbodies once installation of the cables and reinstatement of the watercourse is complete and watercourse enhancement implemented following construction.

Groundwater

9.7.60 The trench for the Grid Connection Cables will have variable depth, dependent upon many factors such as ground conditions and what is encountered on the route e.g., the potential need to go deeper beneath any cables/utilities that are crossed (as further described in **Chapter 2: The Scheme ES Volume 1 [EN010143/APP/6.1]**). The typical trench depth will be 1.2 to 1.4 m. Crossings beneath the River Derwent and River Ouse will be a minimum of 5 m below the channel bed.

9.7.61 On the basis of the historical borehole logs available on the Geoindex website (Ref. 9-48), groundwater levels are variable across the area, with some groundwater encountered at relatively shallow levels less than 3 m below the ground (see section 9.5). Alluvium deposits around watercourses may also carry water at relatively shallow depths.

9.7.62 The cable routes beneath watercourses are anticipated to be below the water table over part of their routes. However, the profile of the cable ducting is considered to be small compared to the spatial and vertical extent of the aquifers. Furthermore, given that cable trenches will generally have a relatively shallow depth of 1.4 m, a negligible impact on groundwater flow is predicted from installation of the Grid Connection Cable overall. As such, no impediment to baseflow in the River Ouse and River Derwent and connected tributaries is anticipated.

9.7.63 As the importance of receptor is classified as high for the Sherwood Sandstone aquifer and medium for Mercia Mudstone and superficial aquifers, and the magnitude of impact is considered to be **negligible**, the installation of the Grid Connection on groundwater flows is assessed to result in a **slight effect (not significant)** and **neutral effect (not significant)**, respectively.

9.7.64 No impacts to groundwater abstractions or PWS are predicted given negligible impact to groundwater flow is predicted, and no active abstractions are located within the immediate vicinity of Grid Connection Corridor, therefore resulting in a **neutral effect (not significant)**. The southern extent of the Scheme around Drax Power Station is in SPZ Zone 3 – Total Catchment. Again, considering the negligible impact on groundwater flow, any impact on the SPZ would be **neutral (not significant)**.

9.7.65 Construction works to install cables beneath the River Ouse, River Derwent, DE53 and Loftsome Bridge Drain using drilling techniques would involve a temporary pit either side of the watercourse (greater than 10 m measured from the water's/channel edge under normal flows, or 30 m in the case of the River Ouse, River Derwent and drain DE53). Maximum parameters for the pit dimensions would be 8 m length x 5 m width x 1 m depth.

9.7.66 As previously described for Featherbed Drain within the Solar PV Site, 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 may be required from the Environment Agency for dewatering, and a discharge consent if this is to be discharged to a watercourse. Again, 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 [EN010143/APP/7.7]**, there is considered to be a negligible impact on groundwater flow. For the medium importance groundwater aquifer (Mercia Mudstone and superficial deposits) this is results in a **neutral effect (not significant)**, and for the high importance groundwater aquifer (Sherwood Sandstone) this results in a **slight adverse effect (not significant)**.

9.7.67 There are historic landfill sites situated in the southern and eastern parts of the Study Area including New Road Landfill Site (NGR SE 66817 27953), Camblesforth Bypass Tip (NGR SE 66105 26389) and Barmby Cutting (NGR SE 69894 28307). There is also Drax Power Station Barlow Mound Ash Disposal Site (EPR/BW9395IF) to the west of the Study Area. The New Road Landfill Site is immediately adjacent to the Grid Connection Corridor boundary. Further details are available in **Chapter 16: Other Environmental Topics ES Volume 1 [EN010143/APP/6.1]** and **Phase 1 PRA Report, Appendix 16-2, ES Volume 2 [EN010143/APP/6.2]**.

9.7.68 While there is potential for migration of contamination associated with these sites into the boundary of the Grid Connection Corridor, the installation of the cable to a general maximum depth of 1.4 m below ground is not considered at this stage to create a significant risk of mobilising contaminants into the underlying aquifers or risking infiltration to the water table. Nonetheless, prior to construction works commencing, a targeted scheme of Ground Investigation and testing followed by a Quantitative Risk Assessment will be completed as further discussed in section **16-4: Ground Conditions of ES Chapter 16: Other Environmental Topics, ES Volume 1 [EN010143/APP/6.1]**. This will be in accordance, if and where necessary, with CLR11 Model Procedures for the Management of Contaminated Land (Ref. 9-88), BS10175:2011+ A2:2017 Investigation of Potentially Contaminated Sites: Code of Practice (Ref. 9-89) and the Environment Agency's GPLC1 Guiding Principles for Land Contamination in Assessing Risks to Controlled Waters (Ref. 9-90). Provided that best practice approaches to identification and remediation of contaminated land are adopted in line with this guidance, then a negligible impact to groundwater quality is predicted with regard to mobilisation of contaminants. For the medium importance groundwater aquifer (Mercia Mudstone and superficial deposits) this is results in a **neutral effect (not significant)**, and for the high importance groundwater aquifer (Sherwood Sandstone) this results in a **slight adverse effect (not significant)**.

9.7.69 Consequently, water quality impacts to rivers receiving baseflow, and groundwater abstractions and the SPZ down gradient are considered to have no change, and thus a **neutral effect (not significant)**.

Flood Risk

9.7.70 An **FRA** is included in **Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**. A summary of flood risk to the Grid Connection Corridor is outlined below.

Fluvial and Tidal Flood Risk

9.7.71 The majority of the Grid Connection Corridor study area is in Flood Zone 2 and 3 and considered to be at high risk, albeit protected by flood defences (**Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**). Should a tidal or 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.

9.7.72 With the implementation of standard construction methods and mitigation as described in Section 9.6, this tidal and fluvial flood risk can be effectively managed. There is also a low likelihood of significant flooding during construction occurring and therefore the flood risk during the construction period is considered low.

9.7.73 As stated within section 9.6 Embedded Mitigation, the Grid Connection Corridor HDD will be used so that the cables will be installed under the River Ouse and River Derwent and adjacent flood defences. This will ensure there will be no impact on the banks and bed of the watercourses, and therefore no effect on the flow regime or flooding potential of these rivers.

9.7.74 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

9.7.75 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 **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]**. During the construction phase the following adverse impacts may occur:

a. 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

b. Changes in flood risk due to the construction of the Grid Connection Corridor crossing the River Ouse, River Derwent and numerous drains.

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

9.7.77 The FRA (**Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]**) considers pluvial flood risk from the Grid Connection Corridors. With the mitigation in place, flood risk is considered low.

9.7.78 Therefore, the impact of construction of the Grid Connection Corridor on pluvial flood risk, from and to the development, is considered to result in a

temporary negligible impact. In terms of very high importance construction workers, this results in a **slight adverse effect (not significant)**.

Flood Risk from Groundwater

9.7.79 The majority of the Grid Connection Corridor is located in an area where there is no or limited potential for groundwater flooding to occur, and it is unlikely to be discernible from fluvial and/or surface water flooding. There are very small, isolated areas where there is potential for groundwater flooding to occur at the surface near the grid connection location.

9.7.80 There may be potential for shallow groundwater levels across the Grid Connection Corridor, and therefore potential for groundwater ingress to excavations during construction. This will be managed following standard construction techniques potentially including pumping, damming, or shoring up excavation pits with sheet piling. Significant groundwater ingress is not anticipated due to the largely clayey, low permeability, superficial geology into which excavations would occur.

9.7.81 Therefore, the impact of construction of the Grid Connection Corridor on groundwater flood risk, from and to the development, is considered to result in a temporary negligible impact. In terms of very high importance construction workers, this results in a **slight adverse effect (not significant)**.

Flood Risk from Sewers and Artificial Sources

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

Operational Effects (assumed 2027 – 2067)

9.7.83 During operation the following environmental impacts may occur:

a. Impacts on water quality in watercourses and groundwater from run-off and the potential for accidental spillages from new permanent hardstanding and maintenance activities, assuming surface water run-off does ultimately drain to a surface watercourse rather than simply to ground;

b. Potential impacts on hydrology as a result of the Scheme. This may also have a subsequent effect on aquatic habitats and water-dependent nature conservation sites;

c. Potential impacts on the rate and volumes of surface water run-off entering local watercourses and increasing the risk of flooding;

d. The current arable fields are treated with fertiliser and pesticides. During the life of the project the use of such chemicals will be ceased which will lead to beneficial impacts on the water environment; and

e. Potential impacts on groundwater resources and local water supplies.

9.7.84 Likely significant effects are summarised in **Table 9-21** at the end of section 9.7, with discussion presented below in the following paragraphs.

Solar PV Site

Water Quality

Impacts from operational site runoff and accidental spillages

9.7.85 As outlined in section 9.6 and the **Framework Surface Water Drainage Strategy** (**Appendix 9-4, ES Volume 2 [EN010143/APP/6.2])**, drainage arrangements are only required for Solar PV Area 1c, and this has been confirmed through consultation with the Ouse and Humber Drainage Board.

9.7.86 For the Solar PV Areas, surface water runoff would be panel runoff only and of low risk in terms of water quality. The panels will be 'tracking' and will therefore not focus surface water in specific areas (no single drip track). While vegetation establishes beneath panels, the ground will be raked in line with contours to encourage the retention and infiltration. Once established, the vegetation beneath the panels will disperse dripping water and prevent defined drip lines from forming. The impermeable area will remain largely consistent with the pre-development state as Solar PV Panels are elevated above ground. Drainage will therefore be as per the existing situation in these areas, but with less potential for defined runoff channels to form. The pollution risk from Solar PV Panel runoff is minimal as they do not contain any liquid (hazardous or not) that could contaminate rainwater, and any contaminants would be derived from atmospheric sources only, as per the existing situation. On this basis, any impact on the receiving superficial and bedrock aquifers or surface watercourses that might receive runoff from Solar PV Panel runoff is considered negligible.

9.7.87 The operations and maintenance hub at Johnson's Farm will be an administration area where office accommodation and welfare facilities will be located. New buildings will occupy the same footprint as those demolished as part of the Scheme. No change in the current drainage behaviour of the site is expected once built as no increase in impermeable area is proposed, and no change in pollution risk is anticipated from these new facilities. Foul water from the site will be collected in a septic tank for off-site disposal by a licensed waste company. Runoff from the existing hardstanding areas will drain to the surrounding fields that will hold solar panels (to the west) or be retained as land for habitat enhancement (to the east). Given that no new impermeable area is proposed, any impact on the groundwater body or nearby drains would be considered negligible.

9.7.88 Field stations, housing inverters, transformers and switchgear, will consist of up to four shipping containers, founded on ground screw piles or strip footings, sitting above ground with gravel or aggregate underneath. This will allow runoff to spread under the units, mitigating any impact from the structures. The units will also be located away from the edge of fields, allowing the surrounding land to further aid in mitigating any runoff. The pollution risk from field station runoff is minimal given that they are self-contained units, and runoff would be that from the roofs only. On this basis, any impact on the receiving superficial and bedrock aquifers or surface watercourses that might receive runoff from the Field stations is considered negligible.

9.7.89 The two Grid Connection Substations will be contained in a single field (Solar PV Area 1c) of approximately 2 ha area with no watercourses or drains in close proximity. There will be areas of hardstanding, access roads,

a small parking area, switchrooms and a shared operations building (see **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]** for further design details). Provisional storage volume requirements for Solar PV Area 1c have been calculated using a 1 in 100-year return period (+ climate change) to suit the 40-year design life of the Scheme. It has been assumed that the design life of the hardstanding elements in Solar PV Area 1c will be 100 years as they could potentially be reused by another development after the decommissioning phase. An upper end allowance of 40% increase in rainfall has been used (see **Framework Surface Water Drainage Strategy Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** for further details). Based on an impermeable area of 0.52 ha the maximum required storage attenuation volume is 750 m^3. The three attenuation channels would provide an attenuation area of ~755 m^2. The infrastructure to collect water and carry it to the storage areas will also be developed as the layout design of the Grid Connection Substations progresses at the detailed design stage (post-consent).

9.7.90 For larger storms, the surface flow will be allowed to leave the field in all directions and ultimately drain to three possible drains: Wilitoft Drain, Fleet Dike and Londesborough Drain. This represents an improvement of the current site runoff because there will be no flow from the site until the attenuation is full. Therefore, only the later stages of extreme rainfall (larger than the 100-year event) will give rise to surface flow leaving the site.

9.7.91 Infiltration testing has not yet taken place on this site, and once complete any required revisions will be captured in the detailed strategy, which is to be provided post-consent and is a Requirement of the DCO.

9.7.92 The proposed attenuation channels will act as attenuation swales and thus also provide treatment for contaminants collected on the areas of hardstanding. The SuDS Manual's Simple Index Approach (Ref 9-30) has been applied to demonstrate the suitability of the proposed SuDS treatment for surface water runoff and spillages. The Low Pollution Hazard Index has been adopted to assess runoff from the Solar PV Area 1c, as this is described in the SuDS Manual as, "*Individual property driveways, residential car parks, low traffic roads and non-residential parking with infrequent change, i.e. less than 300 traffic movements per day*". Given that there will only be three permanent staff employed during the operational phase, less than 300 traffic movements per day would seem appropriate in this case.

9.7.93 **Table 9-19** shows the pollutant hazard index score for different pollutants (total suspended solids, metals, and hydrocarbons) for the Low Pollution Hazard Level, as outlined in the SuDS Manual (Ref 9-30).

9.7.94 The proposed treatment of swales for treatment of surface water flows is included in **Table 9-19**, shown against the low pollution hazard index. To achieve a pass the total mitigation index must meet or surpass the pollution hazard index. On this basis, the mitigation index passes the indicative assessment for total suspended solids, metals, and hydrocarbons.

Table 9-19. Pollution Hazard Indices and the Total Pollutant Mitigation Index for each pollutant

Proposed Development Land Use	SuDS Train	Total Suspended Solids	Metals	Hydrocarbons
Individual property driveways, residential car parks, low traffic roads and non-residential parking with infrequent change, i.e. less than 300 traffic movements per day	*Swale*	*0.5*	*0.6*	*0.6*
	Pollution Hazard Index	0.5	0.5	0.5
	Total Mitigation Index	0.5 (Pass)	0.6 (Pass)	0.6 (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.		

9.7.95 Fuel for machinery and generators will be delivered to site by a fuel bowser as required and stored in integrally bunded above ground fuel storage tanks (cubes). The fuel storage tank will be sheltered, secured from unauthorised access, and equipped with the integral bund will be capable of holding 110% of the volume of the tank (i.e., it will have 10% more capacity than needed). Spill kits will be available at the fuelling point to allow for prompt clean up. Oil storage areas will not be created in areas susceptible to flooding. Should a spillage occur oil would be collected for off-site disposal at a licensed waste facility.

9.7.96 During operation, the Scheme would operate using best practice and comply with environmental legislation through the application of an OEMP**,** including appropriate maintenance of SuDS and other drainage infrastructure. A **Framework OEMP [EN010143/APP/7.8]** is provided with the DCO Application.

9.7.97 It is anticipated that with the embedded mitigation of an appropriate Surface Water Drainage Strategy for Solar PV Area 1c, and negligible changes to drainage across the remainder of the Scheme, there would be no effect on flow pathways from runoff from the Scheme.

9.7.98 Overall, given the implementation of a Surface Water Drainage Strategy including SuDS provision, there would be negligible impact to the receiving groundwater from operational surface water runoff. For the **medium importance** groundwater aquifers (Mercia Mudstone bedrock, Hemingbrough Glaciolacustrine Formation, Thorganby Clay Member and the Breighton Sand superficial deposits), the **negligible** impact from operational runoff would result in a **neutral effect (not significant)**. For the high importance groundwater aquifers (Sherwood Sandstone) this would be a **slight adverse effect (not significant)**.

9.7.99 No operational runoff is directed to surface watercourses, but there is potential for runoff in the event that the 100-year (+ climate change) design event is exceeded, and thus the attenuation storage is surpassed. In this

event surface flow will be allowed to leave the field in all directions and ultimately drain naturally to surrounding drains, and most probably Fleet Dike and Londesborough Drain. These would not be expected to receive any flow until the attenuation channels are full. Given that the pollution hazard level is relatively low from Solar PV Area 1c, any water quality impact to these watercourses would be negligible. For the high importance Fleet Dike, this results in a **slight adverse effect (not significant)**. For the low importance drains this results in a **neutral effect (not significant)**.

9.7.100 As 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 Ouse and River **Derwent, high importance River** Foulness and Fleet Dike and low importance ubiquitous drainage ditches this results in a **neutral effect** in all cases **(not significant)**.

Change in site hydrology

9.7.101 Once the Scheme is operational, there is the potential for a change in surface water runoff or change in hydrology of the watercourses around Solar PV Area 1c. However, the **Framework Surface Water Drainage Strategy, Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**, includes attenuation for this area to ensure negligible impact on the flow in receiving surface water features, notably Fleet Dike and Londesborough Drain. For Fleet Dike as a high importance receptor for water quality, a negligible impact results in a **slight adverse effect (not significant)**, while for all other drains and ditches which are of low importance for water quality there would be a **neutral effect (not significant)**.

Groundwater Flow

9.7.102 No significant risks to the groundwater receptors are anticipated during operation of the Scheme, provided that the operation is conducted in accordance with the embedded mitigation outlined in section 9.6, including adoption of best industry practice to manage the risk of chemical spillages.

9.7.103 There will be no impact on groundwater abstractions as none are situated within the Solar PV Site and once built there would be negligible impact on groundwater flows or quality given implementation of an appropriate Surface Water Drainage Strategy once developed.

9.7.104 Construction of the Grid Connection Substations and associated hardstanding will prevent recharge of rainfall directly under their footprint, but with runoff again being managed appropriately in Solar PV Area 1c as outlined above. These areas of hardstanding are very limited in size in the context of the wider site which will remain permeable.

9.7.105 The change in distribution of groundwater recharge locally is expected to be negligible in terms of its impact on groundwater flow, quality and baseflow to rivers. Where groundwater is of medium importance (Mercia mudstone and

superficial aquifers) this results in a **neutral effect (not significant)**. For the high importance Sherwood Sandstone aquifer this results in a **slight adverse effect (not significant)**. Furthermore, there would be no impact anticipated on groundwater abstractions in the Study Area.

Flood Risk

Fluvial and Tidal Flood Risk

9.7.106 The majority of the Solar PV Site study area (including Interconnecting Cables) is in Flood Zone 1 (see **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**) and considered to be at low risk from fluvial and tidal flooding. However, Solar PV Areas 1e and 2a will include Solar PV Panels in areas of Flood Zones 2 and 3 and are thus at higher risk of flooding. The development has been designed accordingly in order to remain operational during times of flood. Where the Solar PV Panels are located within Flood Zone 3, there has been shown in the **FRA (Appendix 9-3, ES Volume 2 [EN010143/APP/6.2]** to be a negligible loss of floodplain storage volume. To account for the small loss of floodplain storage, flood compensation areas have been proposed to account for this volume (see section 9.6).

9.7.107 Within Flood Zone 3, the tilt range of the tracker panels will be restricted to ensure that a 300 mm freeboard above the modelled design flood event (1% AEP plus climate change) is maintained at all times regardless of whether there is a flood event occurring or not. To increase resiliency of the panels in both Solar PV Areas (1e and 2a), including during the 1% AEP H++ event, when a flood warning is issued by the Environment Agency, the panels will be set to their horizontal (night-time storage) position where the height above ground level will be 2.3 m. The Site will be monitored 24 hours a day and site inspections will occur daily so operatives will set the panels to the horizontal position if increasing water levels are observed or if a flood warning is received.

9.7.108 Field Stations located within Flood Zone 2 and in areas of surface water flood risk will be raised a minimum of 300 mm above the modelled design flood event. Grid Connection Substations will be located within Flood Zone 1. Interconnecting Cables will be buried.

9.7.109 Given this mitigation, it is considered that there would be negligible impact to flood risk on or off site. The Solar PV Site is classified as essential infrastructure and so is a very high importance receptor for fluvial flood risk, thereby resulting in a **slight adverse effect (not significant)**.

Surface Water Flood Risk

9.7.110 The Solar PV Site 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 **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**.

9.7.111 On-site flood risk will be mitigated by raising Solar PV Panels above ground level as outlined in Section 9.6. A **Framework Surface Water Drainage Strategy** (**Appendix 9-4, ES Volume 2 [EN010143/APP/6.2])** has been developed alongside the impact assessment outlining how surface water will be managed from Solar PV Area 1c in order to prevent any increase in flood risk. This would be developed into a detailed Surface Water Drainage Strategy prior to construction, as secured through the DCO. It will provide

measures to manage drainage from new infrastructure required by the Scheme (e.g. access tracks and areas of hardstanding across the Solar PV Site) and manage any required changes to existing land drainage arrangements.

9.7.112 This mitigation would ensure negligible impact to on-site or off-site flooding, which results in a **slight adverse effect (not significant)** in EIA terms for the Scheme as essential infrastructure (very high importance receptor).

Flood Risk from Groundwater

9.7.113 The majority of the Solar PV Site study area is not within an area where there is potential for groundwater flooding to occur, with few isolated areas where there is potential for groundwater flooding to occur at the surface as outlined above. It is considered that groundwater flood risk both to and from the site is unlikely to increase from the Solar PV Site study area during operation as the majority of the infrastructure (e.g. Solar PV Panels, Field Station Units/Field Substations, Grid Connection Substations, etc.) will be above the ground surface. Infiltration into the soil and underlying geology will largely remain as per existing conditions across the site.

9.7.114 Localised impacts on groundwater flows within the vicinity of the buried Interconnecting Cables may occur but are unlikely to increase flood risk to vulnerable receptors as the profile of the cable ducting is considered to be small compared to the spatial and vertical extent of the surrounding aquifers, and aside from Solar PV Panel struts the ground will be largely open space. As such, there is a **neutral effect (not significant)** from flood risk from groundwater.

Flood Risk from Sewers and Artificial Sources

9.7.115 It is not envisaged the flood risk from sewers will increase from the existing situation during the operation of the Scheme. Treatment of foul water for the 3 FTE operatives on site will be via self-contained 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 or water supply 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)**.

9.7.116 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 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

Surface Water

9.7.117 Once operational, cables within the Grid Connection Corridor would be located below ground with no interaction with any surface water feature. As such, there would no pathway for impact on any surface water feature and no further assessment is undertaken of surface water impact from the Grid Connection.

Groundwater

9.7.118 Once operational, there would be very limited potential for impact on groundwater flows given the limited scale of the cable ducting in the context of the wider groundwater aquifers, and no impediment to groundwater flow is anticipated. Consequently, there would be no impact on river baseflow or groundwater abstractions in the Study Area.

9.7.119 The change in distribution of groundwater flows is expected to be **negligible** from the Grid Connection during operation. Where groundwater is of medium importance (Mercia mudstone and superficial aquifer) this results in a **neutral effect (not significant)**. For the high importance Sherwood Sandstone aquifer this results in a **slight adverse effect (not significant)**. Furthermore, there would be no impact anticipated on groundwater abstractions in the Study Area.

Flood Risk (from all sources)

9.7.120 The Grid Connection Corridor will consist predominantly of buried cables, and therefore the likelihood of increased flood risk from this is considered to be low. There would be an estimated 17 below ground link boxes (at indicative depth of 1.8 m) along the route at joins within the Grid Connection Cable, with above manhole covers of approximately 2.0 x 2.0 m set at or just above ground level. However, for flood risk sources above ground (fluvial, tidal, surface water and artificial), this would not lead to a quantifiable increase in risk from these sources.

9.7.121 The depth and construction of the flood defence embankments along the River Ouse and River Derwent will be identified through liaison with the Environment Agency and directional drilling will be used at a sufficient depth to avoid compromising the structural integrity of the flood defence embankments. Therefore, the likelihood of increased flood risk from the corridor crossings is considered to be low.

9.7.122 The proposed buried cable will not increase flood risk from sewers. A search undertaken to identify Yorkshire Water sewerage assets within the Site did not identify any public sewers.

9.7.123 The proposed buried cables may impede groundwater flow locally. The proposed Grid Connection Corridor is within green open space (arable fields and roadside verges) and where it is in roads the impermeable surfacing will prevent ground water emergence. Therefore, any increases are unlikely to affect vulnerable receptors.

9.7.124 Overall, it is considered there would be no change in impact from any flood risk source and no change in off-site flood risk relating to the Grid Connection Corridor, thereby producing a **neutral** effect, which is **not significant** for all forms of flood risk.

Decommissioning Effects – assumed 2067

9.7.125 Potential impacts from the decommissioning of the Solar PV Site 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 (DEMP) (based on the **Framework DEMP [EN/010143/APP/7.9])** will be prepared prior to decommissioning to identify required measures to prevent pollution and flooding during this phase of the development.

9.7.126 The mode of cable decommissioning for the Grid Connection and Interconnecting Cables will be dependent upon government policy and best practice at that time. Currently, the most environmentally acceptable option is considered to be leaving the cables in situ, as this avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to open up the entire length of the cable route.

9.7.127 The pits would be sensitively located so as not to impact watercourses. Given that all cables will be a minimum of 1.5 m below the bed of watercourses (5 m in the case of the River Ouse and River Derwent), this is not anticipated to prevent natural geomorphic evolution or potential future restoration of affected areas. As a result, it is considered the decommissioning impacts and effects would be no greater than those of the construction phase and no additional impacts are anticipated.

Summary of Likely Impacts and Effects

9.7.128 A summary of the assessment of likely impacts and effects for the construction phase is given in **Table 9-20** (and these would also reflect decommissioning effects), and for the operational phase in **Table 9-21**.

Table 9-20. Summary of magnitude of impact and significance of effect (construction and decommissioning)

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
River Ouse	Very High Importance for water quality	Water quality impacts to surface water features during construction and decommissioning (i.e. runoff containing fine sediments, accidental spillages) and trenchless crossing for Grid Connection Cable	Negligible	Slight adverse	No
River Derwent	Very High Importance for water quality				
Fleet Dike	High Importance for water quality	Water quality impacts to surface water features during construction and decommissioning	Negligible	Slight adverse	No
River Foulness	High Importance for water quality	Water quality impacts to surface water features during construction and decommissioning	Negligible	Slight adverse	No
Featherbed Drain	Low Importance for water quality	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Negligible	Neutral	No
Loftsome Bridge Drain	Low Importance for water quality	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Negligible	Neutral	No
Unnamed Drain DE53	Low Importance for water quality	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Negligible	Neutral	No

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
Agricultural Drains, Ditches – where direct works are required (e.g. open cut crossings)	Low Importance for water quality	Water quality impacts to surface water features during construction and decommissioning relating to direct works (e.g. installation/removal of crossings)	Minor adverse	Neutral	No
Agricultural Drains, Ditches – where no direct works are required	Low Importance for water quality	Water quality impacts to surface water features during construction and decommissioning - where they are not directly impacted but could be indirectly impacted (e.g. by runoff)	No change	Neutral	No
River Ouse River Derwent	Low Importance for morphology	Impacts to channel morphology during construction from watercourse crossings (trenchless)	No change	Neutral	No
Fleet Dike	Low Importance for morphology	Impacts to channel morphology during construction from watercourse crossing (open-cut)	Moderate	Slight adverse	No
Featherbed Drain; DE53; Loftsome Bridge Drain	Low Importance for morphology	Impacts to channel morphology during construction from watercourse crossings (trenchless)	No change	Neutral	No

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
Agricultural Drains and Ditches	Low Importance for morphology	Impacts to channel morphology during construction from watercourse crossings and culvert extensions	Moderate adverse	Slight adverse	No
Groundwater – Superficial	Medium Importance	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Negligible	Neutral	No
Groundwater – (Bedrock):		Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Minor adverse	Sherwood Sandstone: Slight adverse	No
Sherwood Sandstone	High Importance				
Mercia Mudstone	Medium Importance			Mercia Mudstone: Neutral	
Flood Risk (from tidal, fluvial, groundwater sources) – construction workers	Very High Importance	Potential for increase of flooding from the site, or to the site as a result of construction	Negligible	Slight adverse	No
Flood Risk (from artificial sources and sewers) –	Very High Importance	Potential for increase of flooding from the site, or to the site as a result of construction	No change	Neutral	No

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
construction workers					

Table 9-21. Summary of magnitude of impact and significance of effect (operation)

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
Fleet Dike	High Importance for water quality	Water quality impacts from operational runoff (diffuse pollution)	Negligible	Slight adverse	No
Agricultural Drains and Ditches	Low Importance for water quality	Water quality impacts from operational runoff (diffuse pollution)	Negligible	Neutral	No
Groundwater: Sherwood Sandstone	High importance	Water quality impacts from operational runoff (diffuse pollution)	Negligible	Neutral	No

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
Groundwater: Mercia Mudstone bedrock, Hemingbrough Glaciolacustrine Formation, Thorganby Clay Member and the Breighton Sand superficial deposits	Medium Importance	Water quality impacts from operational runoff (diffuse pollution)	Negligible	Neutral	No
River Ouse River Derwent	Very High Importance	Reduction in surface water runoff from farmland and agricultural additives	No change	Neutral	No
Fleet Dike	High Importance	Reduction in surface water runoff from farmland and agricultural additives	No change	Neutral	No
River Foulness	High Importance	Reduction in surface water runoff from farmland and agricultural additives	No change	Neutral	No
Agricultural Drains and Ditches	Low Importance for water quality	Reduction in surface water runoff from farmland and agricultural additives	No change	Neutral	No
Fleet Dike	High Importance	Change in hydrology from Scheme runoff	Negligible	Slight adverse	No
Agricultural Drains and Ditches	Low Importance for water quality	Change in hydrology from Scheme runoff	Negligible	Neutral	No

Receptor	Importance	Description of Impact	Magnitude of Impact	Effect Category	Significant Effect (Yes/No)
Groundwater - Superficial	Medium Importance	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Negligible	Neutral	No
Groundwater - (Bedrock): Sherwood Sandstone	High Importance	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Negligible	Sherwood Sandstone: Slight adverse	No
Mercia Mudstone	Medium Importance			Mercia Mudstone: Neutral	
Tidal, Fluvial and Pluvial Flood Risk	Very High Importance	Potential for increase of flooding from the site, or to the site as a result of operation	Negligible	Slight adverse	No
Groundwater and Artificial Source Flood Risk	Low Importance	Potential for increase of flooding from the site, or to the site as a result of operation	Negligible	Neutral	No

9.8 Additional Mitigation, Enhancement, and Monitoring

9.8.1 As no significant effects have been identified, following the incorporation of the embedded measures described in section 9.6, no additional mitigation measures are proposed during construction, operation or decommissioning.

9.8.2 As the land is being taken out of agricultural usage, it is considered there would be a decrease in surface water runoff of agricultural additives to land (i.e. nutrients in the form of phosphates or nitrates or from pesticides, herbicides or insecticides). However, it is considered this would not be a great enough change to result in an effect on the individual water features.

9.8.3 The WMP (to be produced post-consent) will set out details of water quality monitoring to be undertaken during construction. Due to the low level of risk posed by the construction works, this monitoring will consist of visual and olfactory observations as well as in-situ testing using hand-held water quality meters only. The requirement for a WMP will be secured via the **Framework CEMP [EN010143/APP/7.7]**. No water quality monitoring is required during the operational period. It is anticipated that water quality monitoring would be required during the decommissioning phase, this will be defined in the detailed DEMP (as secured through the **Framework DEMP [EN/010143/APP/7.9]** which is provided as part of the DCO Application).

9.9 Residual Effects

9.9.1 This section summarises the residual significant effects of the Scheme on Flood Risk, Drainage and Surface Water following the implementation of embedded and additional mitigation.

9.9.2 Following the implementation of embedded mitigation as outlined in section 9.6, including best practice measures secured via the **Framework CEMP [EN010143/APP/7.7], OEMP [EN010143/APP/7.8]** and **DEMP [EN010143/APP/7.9]** the assessment of likely impacts and effects (section 9.7) identified no significant effects to any of the identified receptors during the construction, operation or decommissioning phases of the Scheme. As such, no additional mitigation measures are required and the residual effects remain as assessed in section 9.7 and presented in **Table 9-20** and **Table 9-21**..

9.9.3 For completeness, the residual effects are reproduced in **Table 9-22** and **Table 9-23.**

Table 9-22. Residual effects – (construction and decommissioning)

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
River Ouse	Water quality impacts to surface water features during construction and decommissioning (i.e. runoff containing fine sediments, accidental spillages) and trenchless crossing for Grid Connection Cable	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate trenchless crossing methodology including frac-out risk assessments	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
River Derwent	Water quality impacts to surface water features during construction and decommissioning (i.e. runoff containing fine sediments, accidental spillages) and trenchless crossing for Grid Connection Cable	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate trenchless crossing methodology including frac-out risk assessments	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
Fleet Dike	Water quality impacts to surface water features during construction and decommissioning (and open-cut crossing)	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate open-cut crossing construction methodology.	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
River Foulness	Water quality impacts to surface water features during construction and decommissioning	Application of measures outlined in the Framework CEMP (including water quality monitoring).	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Featherbed Drain	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate trenchless crossing construction methodology.	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
Loftsome Bridge Drain	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate trenchless crossing construction methodology.	Neutral – Not significant	No additional measures	Neutral – Not significant
Unnamed Drain DE53	Water quality impacts to surface water features during construction and decommissioning, including trenchless crossing	Application of measures outlined in the Framework CEMP (including water quality monitoring). Appropriate trenchless crossing construction methodology.	Neutral – Not significant	No additional measures	Neutral – Not significant
Agricultural Drains, Ditches – where direct works are required (e.g. open cut crossings)	Water quality impacts to surface water features during construction and decommissioning relating to direct works (e.g.	Application of measures outlined in the Framework CEMP (including water quality monitoring).	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
	installation/removal of crossings)	Appropriate open-cut crossing construction methodology.			
Agricultural Drains, Ditches – where no direct works are required	Water quality impacts to surface water features during construction and decommissioning - where they are not directly impacted but could be indirectly impacted (e.g. by runoff)	Application of measures outlined in the Framework CEMP (including water quality monitoring).	Neutral – Not significant	No additional measures	Neutral – Not significant
River Ouse	Impacts to channel morphology during construction from watercourse crossings (trenchless)	Cable to be minimum of 5 m below bed, and 16 m buffer between HDD send and receive pits from the landward toe of flood defences	Neutral – Not significant	No additional measures	Neutral – Not significant
River Derwent	Impacts to channel morphology during construction from watercourse crossings (trenchless)	Cable to be minimum of 5 m below bed, and 16 m buffer between HDD send and receive	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
		pits from the landward toe of flood defences			
Fleet Dike	Impacts to channel morphology during construction from watercourse crossing (open-cut)	Pre-works hydromorphological survey and reinstatement as found. Working in dry weather where practicable. Appropriate open-cut crossing construction methodology.	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Featherbed Drain; DE53; Loftsome Bridge Drain	Impacts to channel morphology during construction from watercourse crossings (trenchless)	Cable to be 1.5 m below bed as a minimum, and 10m buffer from watercourses (or 16 between HDD send and receive pits from the landward toe of flood defences).	Neutral – Not significant	No additional measures	Neutral – Not significant
Agricultural Drains and Ditches	Impacts to channel morphology during construction from watercourse	Pre-works hydromorphological survey and reinstatement as found.	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
	crossings and culvert extensions	Working in dry weather where practicable. Appropriate crossing construction methodology. Environmentally sensitive culvert extensions. Length-for-length equivalent watercourse enhancements are required for each new culvert extension			
Groundwater – Superficial deposits	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Application of measures outlined in the Framework CEMP	Neutral – Not significant	No additional measures	Neutral – Not significant
Groundwater - Sherwood Sandstone	Impacts on groundwater flow (and thereby local abstractions, PWS	Application of measures outlined in the Framework CEMP	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
	and river baseflow) and quality				
Groundwater – Mercia Mudstone	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Application of measures outlined in the Framework CEMP	Neutral – Not significant	No additional measures	Neutral – Not significant
Flood Risk (from tidal, fluvial, groundwater sources) – construction workers	Potential for increase of flooding from the site, or to the site as a result of construction	Application of measures outlined in the Framework CEMP (including water quality monitoring) and Emergency Response Plan	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Flood Risk (from artificial sources and sewers) – construction workers	Potential for increase of flooding from the site, or to the site as a result of construction	Application of measures outlined in the Framework CEMP (including water quality monitoring) and Emergency Response Plan	Neutral – Not significant	No additional measures	Neutral – Not significant

Table 9-23. Residual effects – (operation)

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
Fleet Dike	Water quality impacts from operational runoff (diffuse pollution)	Implementation of Framework Surface Water Drainage Strategy	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Agricultural Drains and Ditches	Water quality impacts from operational runoff (diffuse pollution)	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant
Groundwater: Sherwood Sandstone	Water quality impacts from operational runoff (diffuse pollution)	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant
Groundwater: Mercia Mudstone bedrock, Hemingbrough Glaciolacustrine Formation, Thorganby Clay Member and the Breighton Sand superficial deposits	Water quality impacts from operational runoff (diffuse pollution)	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
River Ouse	Reduction in surface water runoff from farmland and agricultural additives	n/a	Neutral – Not significant	No additional measures	Neutral – Not significant
River Derwent	Reduction in surface water runoff from farmland and agricultural additives	n/a	Neutral – Not significant	No additional measures	Neutral – Not significant
Fleet Dike	Reduction in surface water runoff from farmland and agricultural additives	n/a	Neutral – Not significant	No additional measures	Neutral – Not significant
River Foulness	Reduction in surface water runoff from farmland and agricultural additives	n/a	Neutral – Not significant	No additional measures	Neutral – Not significant
Agricultural Drains and Ditches	Reduction in surface water runoff from farmland and	n/a	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
	agricultural additives				
Fleet Dike	Change in hydrology from Scheme runoff	Implementation of Framework Surface Water Drainage Strategy	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Agricultural Drains and Ditches	Change in hydrology from Scheme runoff	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant
Groundwater -Superficial	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant
Groundwater -(Bedrock): Sherwood Sandstone	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Implementation of Framework Surface Water Drainage Strategy	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
Groundwater -(Bedrock): Mercia Mudstone	Impacts on groundwater flow (and thereby local abstractions, PWS and river baseflow) and quality	Implementation of Framework Surface Water Drainage Strategy	Neutral – Not significant	No additional measures	Neutral – Not significant
Tidal, Fluvial and Pluvial Flood Risk	Potential for increase of flooding from the site, or to the site as a result of operation	Implementation of Framework Surface Water Drainage Strategy. Panels and field stations raised appropriate level above ground level in Flood Zone 2 and 3, and are tracking. Panels set horizontal when flood alert received.	Slight Adverse – Not significant	No additional measures	Slight Adverse – Not significant
Groundwater and Artificial Source Flood Risk	Potential for increase of flooding from the site, or to the site as a result of operation	Implementation of Framework Surface Water Drainage Strategy. Panels raised appropriate level above ground and are tracking. Panels set	Neutral – Not significant	No additional measures	Neutral – Not significant

Receptor	Description of impacts including duration	Embedded mitigation	Significance of effect with embedded mitigation	Additional mitigation/enhancement measures	Residual effect
		horizontal when flood alert received.			

9.10 Cumulative Effects

9.10.1 This section assesses the potential effects of the Scheme in combination with the potential effects of other proposed and committed plans and projects including other developments (referred to as 'cumulative schemes') within the surrounding area.

9.10.2 A short list of relevant developments is presented in **Appendix 17-1, ES Volume 2 [EN010143/APP/6.2]**.

a. Of those developments listed in **Appendix 17-1, ES Volume 2 [EN010143/APP/6.2]**, the following developments are considered to have potential for cumulative effects, due to being located in the Study Area and of a nature that could lead to cumulative effects to the water environment, or adjacent to water receptors which are potentially impacted by the Scheme (notably the River Ouse, River Derwent and River Foulness). Further details for each of the developments are given in **Appendix 17-1, ES Volume 2 [EN010143/APP/6.2]**. The developments with the potential to lead to cumulative effects are:

b. ID1 – Helios Renewable Energy Project (Planning Ref. EN010140) – Construction and operation of a solar energy project, including a Grid Connection to Drax Power Station. The grid connection for this proposed renewable project may interact with some of the same drains identified in the Study Area of this chapter.

c. ID 2 - Scotland to England Green Link (SEGL2) (Planning Ref. 22/01990/STPLFE). Construction of sub-surface cable route from Drax Power Station to Fraisthorpe Coastline. There is partial overlap between this proposed development boundary and the Order limits to the east of Drax Power Station. Both schemes would interact with drains to the east of the Power Station (e.g. OU42).

d. ID 3 - SEGL2 (Planning Ref. 2022/0711/EIA). Hybrid Planning Application comprising two parts: (Part 1) Outline planning permission (all matters reserved) for the construction of a converter station at Drax, Selby; (Part 2) full planning permission for the installation of high voltage direct current (HVDC) underground cables from the River Ouse to the converter station and high voltage alternating current (HVAC) underground cables from the converter station to the existing Drax Substation as well as all associated temporary works including compounds, accesses and bellmouths as part of the construction of Scotland-England Green Link 2 (SEGL2), a two gigawatt (GW) reinforcement of the electricity transmission system between Peterhead, Scotland and Drax, England. Installation of underground HVDC cables from Mean Low Water Springs (MLWS) at Fraisthorpe, East Riding to the River Ouse and associated temporary works relating to land in an adjoining authority. There is partial overlap between this proposed development boundary and the Order limits to the east of Drax Power Station, and both schemes would cross the River Ouse (within approximately 1.6 km of each other). There is also overlap between the schemes in Solar PV Area 2g and 3c, and SEGL2 would cross the River Foulness downstream of the Scheme Order limits.

e. ID 4 - Drax Carbon Capture (Planning Ref. EN010120). Proposal to install post-combustion technology would capture carbon dioxide

emission from up to two of the existing biomass units at Drax Power Station. The Order limits for this proposed development extend to the River Ouse and include drainage ditches to the east of Drax Power Station, and thus overlap to some extent with the Scheme assessed herein.

f. ID 5 – Humber Low Carbon Pipelines (Planning Ref. EN070006). Construction of carbon dioxide and hydrogen transportation pipelines between Drax (North Yorkshire), and Easington (East Riding, Yorkshire). The proposed development boundary would overlap with the Scheme assessed herein to the south of the River Ouse around the northern and eastern extent of Drax Power Station.

g. ID6 - Drax Re-Power (Planning Ref. EN010091) Drax Power Ltd is proposing to modify up to two of the coal-fired generating units (known as Units 5 and 6) at Drax Power Station, Selby, to become gas-powered generating plant. The proposed development would overlap with the Scheme assessed herein along the Grid Connection Corridor to the east of Drax Power Station.

h. ID 7 – Relief Road and residential development at Land South of Thorpe Hall, Howden (Planning Ref. 22/02118/STPLFE). The proposed development is to the south of Solar PV Area 2g, and there could be hydrological connectivity between the two via drainage ditches.

i. ID 15 – Poultry buildings at Old Rush Farm, Spaldington Road (Planning Ref. 20/01043/STPLFE). Construction of four poultry buildings with associated feed bins, concrete apron, gate house, gas tanks, water tank, water treatment building, and rainwater harvesting lagoon. The proposed development has potential connectivity to the Scheme via Commonend Drain and East Goit Sewer.

j. ID 22 – Camblesforth Solar Farm Ltd (Planning Ref. 2020/0784/SCN). Development of a ground mounted solar farm and associated infrastructure on land north and south of Camela Lane. There is potential for hydrological connectivity between the proposed development and the Scheme assessed herein via Carr Dike and Lendall Drain.

k. ID 25 and 26 – Lakeside Energy Storage (Planning Ref. 2020/1357/FULM). Development of an energy storage facility which includes battery storage containers, substations, power conversion systems and associated switchgear. This is located east of Drax Power Station and would overlap with the Scheme assessed herein at its southern extent (of the Grid Connection Corridor).

l. ID 27 – Recovery of Ash at Drax Power Station (Planning Ref. 2022/0107/NYSCO). Proposed additional recovery of ash resource. This propose development is located west of Drax Power Station but there is potential for hydrological connectivity between the proposed development and the Scheme assessed herein via Carr Dike and Lendall Drain.

m. ID 29 – Industrial units on land east of The Knoll Booth, Ferry Road (Planning Ref. 22/01005/PLF). Erection of two buildings to form three industrial units including new yerd access and access. There is

potential connectivity to the Scheme assessed herein via local drains (e.g. Southwood Drain).

n. ID 51 – HOW - G Residential Allocation within East Riding of Yorkshire Local Plan Update for 1400 dwellings plus employment, retail and community uses. (Planning Ref. n/a). There is potential connectivity to the Scheme assessed herein via local drains.

o. ID 61 – Anaerobic Digestion Plant at Spaldington Airfield (Planning Ref. 22/03606/CM). Installation of oil separation unit, storage tank, boiler, battery unit- pending approval. This is located in close proximity to the Scheme assessed herein, between Solar PV Areas 2d and 2e.

p. ID 68 / 69 / 70 – Energy Infrastructure- Construction (Planning Ref. 2020/0561/FULM, 2020/0462/DEM, 2020/0994/FULM). Additional building development at South Contractors Village (within Drax Power Station) and demolition of four bulk storage tanks and Flue Gas Desulphurisation (FGD) Plant (and restoration works). There is potential for connectivity between watercourses within and around Drax Power Station and the Scheme assessed herein.

q. ID 75 – Battery Storage Facility, land off Hales Lane (Planning Ref. 2021/1089/FULM). Development of battery storage facility, associated infrastructure, access and grid connection. The Grid Connection for this proposed renewable project would overlap with the southern extent of the Order limits and may interact with drains in the vicinity.

Cumulative Effects during Construction

9.10.3 There is potential for overlap between construction of this Scheme and impacts from adjacent schemes 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 (see **Table 9-24**), as is being proposed for this Scheme, the cumulative effects risk can be effectively managed and there would not be a significant increase in the risks to any relevant waterbodies. As such, there would not be expected to 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 9-24**. Similar cumulative effects would be anticipated during decommissioning.

Table 9-24. Summary of Cumulative Effect assessment during Construction (assumed 2025-2027)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID1: Helios Renewable Energy Project (Planning Ref. EN010140) – Construction and operation of a solar energy project, including a Grid Connection to Drax Power Station.	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Construction starting in 2025 would coincide with the Scheme.	Best practice construction measures are assumed to be adopted through the use of a CEMP (or similar), with appropriate adherence to planning and permit conditions.	No change – same as residual effect (not significant)
ID 2: SEGL2: Construction of sub-surface cable route from Drax Power Station to Fraisthorpe Coastline (Planning Ref. 22/01990/STPLFE).	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. No morphological risks to the River Ouse are anticipated as overhead lines or boring would be used beneath the river. SEGL2 would cross the River Foulness but the Scheme has no morphological impact on this watercourse. Construction starting in 2024 would coincide with the Scheme.	Best practice construction measures are assumed to be adopted through the use of a CEMP (or similar), with appropriate adherence to planning and permit conditions. No direct physical works to the River Ouse.	No change – same as residual effect (not significant)
ID3: Hybrid Planning Application for HVDC Cables, HVAC Cables and Converter Station (Planning Ref. 2022/0711/EIA).	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. No morphological risks to the River Ouse are		No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
	anticipated as overhead lines or boring would be used beneath the river. SEGL2 would cross the River Foulness but the Scheme has no morphological impact on this watercourse. Construction starting in 2024 would coincide with the Scheme.		
ID4: Drax Carbon Capture- post combustion capture technology (Planning Ref. EN010120).	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. The Order limits for the Scheme extend to the River Ouse and include drainage ditches to the east of Drax Power Station.	Best practice construction measures assumed to be adopted through the use of a CEMP (or similar), with appropriate adherence to planning and permit conditions.	No change – same as residual effect (not significant)
ID5: Humber Low Carbon Pipelines (Planning Ref. EN070006).	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction.		No change – same as residual effect (not significant)
ID 6: Drax Re-Power (Planning Ref. EN010091)			No change – same as residual effect (not significant)
ID7: Relief Road and residential development at Land South of Thorpe Hall, Howden (Planning Ref. 22/02118/STPLFE).			No change – same as residual effect (not significant))

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID15: Poultry buildings at Old Rush Farm, Spaldington Road (Planning Ref. 20/01043/STPLFE)	Potential pollution from construction site to East Goit Sewer and Commonend Drain. Potential for increased surface water runoff delivering increase sediment loads, chemical spillages and increased flood risk. Planning has been granted but the extent of the construction period is not currently known.		No change – same as residual effect (not significant)
ID 22: Camblesforth Solar Farm Ltd (Planning Ref. 2020/0784/SCN)	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. The proposed development is at EIA Screening stage and so construction programme is not yet known.		No change – same as residual effect (not significant)
ID25 and 26: Lakeside Energy Storage (Planning Ref. 2020/1357/FULM)	Potential pollution from construction site to local watercourses and tributaries and increased surface water delivering increase sediment loads, chemical spillages and increased flood risk. Project is approved but not yet started construction and so there is potential for overlap.		No change – same as residual effect (not significant)
ID 27 – Recovery of Ash at Drax Power Station (Planning Ref. 2022/0107/NYSCO)	Potential pollution to local watercourses and/or groundwater from construction site		No change – same as residual

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
	runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. The proposed development is at EIA Scoping stage and so construction programme is not yet known.		effect (not significant)
ID29: Industrial units on land east of The Knoll Booth, Ferry Road (Planning Ref. 22/01005/PLF).	Potential pollution to local watercourses (e.g. Southwood Drain) and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Project has been granted planning but construction programme is known.	Best practice construction measures assumed to be adopted with appropriate adherence to planning and permit conditions. Land drainage and FRA considered within the project.	No change – same as residual effect (not significant)
ID51: HOW- G Residential Allocation (Planning Ref. n/a)	This development is at this stage part of an emerging local plan allocation. There is potential pollution from construction site to nearby surface water and groundwater bodies via construction runoff containing sediment and chemical spillages and there is potential for increased flood risk. However, the details of the development are yet to be determined. Construction programme not known at this stage.	Best practice construction measures are assumed to be adopted at the appropriate time through the use of a CEMP (or similar), with appropriate adherence to planning and permit conditions.	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID61: Anaerobic Digestion Plant at Spaldington Airfield (Planning Ref. 22/03606/CM).	Potential pollution from construction site runoff and accidental spillages to Commonend Drain and surrounding unnamed drains, and potential for increased flood risk. Planning permission is pending and construction programme unknown.	Best practice construction measures to be adopted using a CEMP (or similar), with appropriate adherence to planning and permit conditions.	No change – same as residual effect (not significant)
ID 68 / 69 / 70 – (Planning Ref. 2020/0561/FULM, 2020/0462/DEM, 2020/0994/FULM). Additional building development at South Contractors Village (within Drax Power Station) and demolition of four bulk storage tanks and FGD)Plant (and restoration works).	Potential pollution from construction site runoff and accidental spillages to Carr Dike and other watercourses surrounding Drax Power Station, and potential for increased flood risk. Planning permission has been granted but construction programme is unknown (and so there is potential for overlap).		No change – same as residual effect (not significant)
ID70: Energy Infrastructure- Demolition (Planning Ref. 2020/0994/FULM).	Potential pollution from demolition site to Feathered Drain and Great Committee Drain and increased surface water delivering increase sediment loads, chemical spillages and increased flood risk. Project is yet to receive planning permission and so projects may overlap. Land drainage and FRA unknown at this stage.		No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID75: Battery Storage Facility, land off Hales Lane (Planning Ref. 2021/1089/FULM).	Potential pollution to local watercourses and/or groundwater from construction site runoff containing pollutants and fine sediment; chemical spillages; increased flood risk during construction. Construction programme is unknown but planning has been approved and so construction may coincide with the Scheme.		No change – same as residual effect (not significant)

Cumulative Effects during Operation

9.10.4 Drainage strategies for all cumulative developments would be produced with reference to the relevant policies and guidance documents outlined in section 9.2. It is assumed that flood risk assessments and appropriate drainage strategies are to be developed in line with best practice.

9.10.5 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 would not be anticipated to produce any significant effects. Potential operational phase cumulative effects, mitigation and significance are summarised in **Table 9-25**.

Table 9-25. Summary of Cumulative Effect assessment during Operation

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID 1: Helios Renewable Energy Project (Planning Ref. EN010140) – Construction and operation of a solar energy project, including a Grid Connection to Drax Power Station.	Potential pollution of surface or groundwater bodies 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. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried.	It is expected that 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.	No change – same as residual effect (not significant)
ID 2: SEGL2: Construction of sub-surface cable route from Drax Power Station to Fraisthorpe Coastline (Planning Ref. 22/01990/STPLFE).	Limited potential for adverse effects during operation given the sub-surface nature of the proposed development and the Grid Connection Corridor for the Scheme.	This planning application has been approved and includes appropriate mitigation for flood risk and drainage impacts where required.	No change – same as residual effect (not significant)
ID3: Hybrid Planning Application for HVDC Cables, HVAC Cables and Converter Station (Planning Ref. 2022/0711/EIA).			No change – same as residual effect (not significant)
ID4: Drax Carbon Capture- post combustion capture technology (Planning Ref. EN010120).	Potential pollution of surface or groundwater bodies from diffuse urban runoff from the development; increased flood risk from increased impervious area in the catchment. Potential	A Drainage Strategy and Flood Risk Assessment have been submitted with the ES for the development. Appropriate design of structures is to be included where relevant.	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
	hydromorphological impacts to surface watercourses from watercourse crossings or road outfalls. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried.		
ID5: Humber Low Carbon Pipelines (Planning Ref. EN070006).	Limited potential for adverse effects during operation given the sub-surface nature of the development and the Grid Connection Corridor for the Scheme.	It is expected that a Drainage Strategy and Flood Risk Assessment will be submitted with the ES for the development, as well as appropriate design of structures where relevant. However, there would be limited potential for operational effects as a subsurface development.	No change – same as residual effect (not significant)
ID 6: Drax Re-Power (Planning Ref. EN010091)	Potential pollution of surface or groundwater bodies 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 or road outfalls. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried.	A Drainage Strategy and Flood Risk Assessment have been submitted with the ES for the development. Appropriate design of structures is to be included where relevant.	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID7: Relief Road and residential development at Land South of Thorpe Hall, Howden (Planning Ref. 22/02118/STPLFE).	Potential pollution of the surface or groundwater bodies 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 or road outfalls.	A Drainage Strategy and Flood Risk Assessment has been 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.	No change – same as residual effect (not significant)
ID15: Poultry buildings at Old Rush Farm, Spaldington Road (Planning Ref. 20/01043/STPLFE)	Potential pollution from operational runoff (of diffuse pollutants) to East Goit Sewer and Commonend Drain if not mitigated. Increased flood risk from increased impervious area in the catchment.	A Drainage Strategy and Flood Risk Assessment was submitted with planning for the development, incorporating SuDS to control runoff rate and provide water quality treatment.	No change – same as residual effect (not significant)
ID 22: Camblesforth Solar Farm Ltd (Planning Ref. 2020/0784/SCN)	Potential pollution of surface waterbodies (e.g. Carr Dike and Lendall Drain) or groundwater bodies 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. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is	It is expected that 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.	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
	buried. There would be no cumulative impacts from the Solar PV Site.		
ID25 and ID26: Lakeside Energy Storage (Planning Ref. 2020/1357/FULM)	Potential pollution from operational runoff to drains around Drax Power Station if not mitigated. Increased flood risk from increased impervious area in the catchment. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried. There would be no cumulative impacts from the Solar PV Site.	This planning application has been approved and includes appropriate mitigation for flood risk and drainage impacts where required.	No change – same as residual effect (not significant)
ID 27 – Recovery of Ash at Drax Power Station (Planning Ref. 2022/0107/NYSCO)	Potential pollution of surface waterbodies (e.g. Carr Dike and Lendall Drain) or groundwater bodies from diffuse urban runoff from the development. Potential hydromorphological impacts to surface watercourses from watercourse crossings and road outfalls, if required. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried. There would be no cumulative impacts from the Solar PV Site.	It is expected that a Drainage Strategy and Flood Risk Assessment will be submitted with the ES for the development. Appropriate design of structures is to be included.	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
ID29: Industrial units on land east of The Knoll Booth, Ferry Road (Planning Ref. 22/01005/PLF).	Potential pollution from operational runoff (of diffuse pollutants) to Southwood Drain and other unnamed drains if not mitigated. Increased flood risk from increased impervious area in the catchment.	A Drainage Strategy and Flood Risk Assessment was submitted with planning for the development, incorporating SuDS to control runoff rate and provide water quality treatment.	No change – same as residual effect (not significant)
ID 51: HOW- G Residential Allocation (Planning Ref. UNKNOWN)	This development is at this stage part of an emerging local plan allocation. Potential pollution from operational runoff (of diffuse pollutants) to surrounding watercourses and groundwater if not mitigated. Potential for increased flood risk from increased impervious area in the catchment.	It is expected that 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.	No change – same as residual effect (not significant)
ID61: Anaerobic Digestion Plant at Spaldington Airfield (Planning Ref. 22/03606/CM).	Potential pollution from operational runoff (of diffuse pollutants) to surrounding watercourses (e.g. Commonend Drain) and groundwater if not mitigated. Potential for increased flood risk from increased impervious area in the catchment.	A Flood Risk Assessment (including drainage strategy) was submitted with planning for the development, incorporating SuDS to control runoff rate and provide treatment of pollutants.	No change – same as residual effect (not significant)
ID 68 / 69 / 70 – (Planning Ref. 2020/0561/FULM, 2020/0462/DEM, 2020/0994/FULM). Additional building development at South Contractors Village (within Drax Power Station) and	Potential pollution from operational runoff (of diffuse pollutants) to surrounding watercourses (e.g. Carr Dike) from South Contractors Village. However, it should be noted that there should be no impacts from the operational	Not applicable as planning for South Contractors Village was retrospective, but it is assumed that suitable drainage arrangements are in place for runoff and welfare facilities. There will not be an	No change – same as residual effect (not significant)

Development	Potential Cumulative Impact	Mitigation	Potential Cumulative Effect (taking mitigation into account)
demolition of four bulk storage tanks and FGD Plant (and restoration works).	Scheme given that the Grid Connection Cable is buried. There would be no cumulative impacts from the Solar PV Site.	operational element to the demolition of four bulk storage tanks and FGD Plant once land is restored.	
ID75: Battery Storage Facility, land off Hales Lane (Planning Ref. 2021/1089/FULM).	Potential pollution of surface or groundwater bodies 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. However, it should be noted that there should be no impacts from the operational Scheme given that the Grid Connection Cable is buried.	A Drainage Strategy and Flood Risk Assessment are assumed to have been submitted with planning for the development although are not available on the planning portal. It is assumed that appropriate design of structures is to be included where necessary.	No change – same as residual effect (not significant)

9.11 References

Ref. 9-1 Environment Act (2021). Available at: https://www.legislation.gov.uk/ukpga/2014/21/contents [Accessed: 08/02/2023].

Ref. 9-2 Water Act (2014). Available at: https://www.legislation.gov.uk/ukpga/2014/21/contents [Accessed: 08/02/2023].

Ref. 9-3 Flood and Water Management Act (2010). Available at: https://www.legislation.gov.uk/ukpga/2010/29/contents [Accessed: 08/02/2023].

Ref. 9-4 Environmental Protection Act (1990). Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents [Accessed: 08/02/2023].

Ref. 9-5 Land Drainage Act (1991). Available at: https://www.legislation.gov.uk/ukpga/1991/59/section/37 [Accessed: 08/02/2023].

Ref. 9-6 Water Resources Act (1991). Available at: https://www.legislation.gov.uk/ukpga/1991/57/contents [Accessed: 08/02/2023].

Ref. 9-7 Salmon and Freshwater Fisheries Act (1975). Available at: https://www.legislation.gov.uk/ukpga/1975/51/2010-01-12 [Accessed: 08/02/2023].

Ref. 9-8 The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017). Available at: https://www.legislation.gov.uk/uksi/2017/407/2019-10-31 [Accessed: 08/02/2023].

Ref. 9-9 The Environmental Damage (Prevention and Remediation) (England) (Amendment) Regulations (2017). Available at: https://www.legislation.gov.uk/uksi/2017/1177/contents/made [Accessed: 08/02/2022].

Ref. 9-10 The Environmental Permitting (England and Wales) Regulations (2016). Available at: https://www.legislation.gov.uk/uksi/2016/1154/regulation/12/2018-04-18 [Accessed: 08/02/2023].

Ref. 9-11 Eels (England and Wales) Regulation (2009). Available at: https://www.legislation.gov.uk/uksi/2009/3344/contents [Accessed: 08/02/2023].

Ref. 9-12 Control of Pollution (Oil Storage) (England) Regulations (2001). Available at: https://www.legislation.gov.uk/uksi/2001/2954/contents [Accessed: 08/02/2023].

Ref. 9-13 The Control of Substances Hazardous to Health Regulations 2002 (as amended). Available at: https://www.legislation.gov.uk/uksi/2004/3386/contents [Accessed: 08/02/2023].

Ref. 9-14 The Anti-Pollution Works Regulations (1999). Available at: https://www.legislation.gov.uk/uksi/1999/1006/introduction/made [Date Accessed: 08/02/2023].

Ref. 9-15 The Water Framework Directive (Standards and Classification) Directions (2015). Available at:

https://www.legislation.gov.uk/uksi/2003/3242/pdfs/uksiod_20033242_en_002.pdf [Accessed: 08/02/2023].

Ref. 9-16 The Levelling-up and Regeneration Act 2023 Available at: https://www.legislation.gov.uk/ukpga/2023/55/enacted [Accessed: 18/11/2023].

Ref. 9-17 Department of Energy and Climate Change (DECC) (2011) National Policy Statement for Energy (EN-1).

Ref. 9-18 DECC (2011) National Planning Statement (NPS) for Renewable Energy EN-3 (2011).

Ref. 9-19 DECC (2011) National Planning Statement (NPS) for Electricity Networks EN-5.

Ref. 9-20 Department for Energy Security and Net Zero (DESNZ) (BEIS) (2023) Draft Overarching National Policy Statement for Energy (EN-1) (2023).

Ref. 9-21 DESNZ (2023) National Planning Statement (NPS) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3).

Ref. 9-22 DESNZ (2023) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5).

Ref. 9-23 Department for Levelling Up, Housing and Communities and Local Government (2023). National Planning Policy Framework (NPPF), Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182995/NPPF_Sept_23.pdf [Date Accessed 19 September 2023].

Ref. 9-24 Department of Communities and Local Government (2023). National Planning Practice Guidance (NPPG).

Ref. 9-25 Department of Communities and Local Government (2014). National Planning Practice Guidance: Flood Risk and Coastal Change.

Ref. 9-26 The UK Government's Environmental Improvement Plan 2023.

Ref. 9-27 The UK Government's 25 Year Environment Plan.

Ref. 9-28 The UK Government's Future Water Strategy (2011).

Ref. 9-29 The UK Government's Plan for Water: our integrated plan for delivering clean and plentiful water (2023).

Ref. 9-30 The Non-statutory technical standards for Sustainable Drainage Systems.

Ref. 9-31 CIRIA (2016). Report C753 The SuDS Manual 2nd Edition.

Ref. 9-32 National Highways (2020). DMRB CD532 Vegetated Drainage Systems for Highways Runoff.

Ref. 9-33 The Building Regulations 2010 Approved Document Part H: Drainage and Waste Disposal.

Ref. 9-34 Water UK (2019) Sewerage Sector Guidance.

Ref. 9-35 East Riding of Yorkshire Council (2016). East Riding Local Plan 2019-2029 (adopted April 2016). Available at: https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan/ [Accessed 09 August 2023]

Ref. 9-36 East Riding of Yorkshire Council (2022). East Riding Local Plan Update 2020 – 2039 Proposed Submission Strategy Document Update. Available at: https://downloads.eastriding.org.uk/corporate/planning/planning-policy-and-the-local-plan/local-plan-update-submission-and-examination/documents-submitted-for-examination/S-LP01%20Strategy%20Document%20Update.pdf [Accessed 09 August 2023]

Ref. 9-37 Selby District Council (2005). Selby District Local Plan 2005. Available at: https://www.northyorks.gov.uk/planning-and-conservation/planning-policy/planning-policy-your-local-area/selby-planning-policy/selby-development-plan [Accessed 09 August 2023]

Ref. 9-38 Selby District Council (2013). Selby District Core Strategy Local Plan (2013). Available at: https://www.selby.gov.uk/core-strategy-2013 [Accessed 09 August 2023]

Ref. 9-39 Selby District Council (2022) Local Plan Publication Version Consultation. Available at: https://democracy.selby.gov.uk/documents/s16614/Appendix%201%20Publication%20Local%20Plan.pdf [Accessed 09 August 2023]

Ref. 9-40 East Riding of Yorkshire Council (2016). Sustainable Drainage Systems (SuDS) & Surface Water Drainage Requirements For New Development. Available at: https://www.eastriding.gov.uk/EasySiteWeb/GatewayLink.aspx?alId=604683 [Accessed: 08/02/2023].

Ref. 9-41 North Yorkshire County Council (2019). North Yorkshire County Council SuDS Design Guidance. Available at: https://edemocracy.northyorks.gov.uk/Data/Business%20and%20Environmental%20Services%20Corporate%20Director%20and%20Executive%20Members%20Meeting/20190125/Agenda/3%20a)%20NYCC%20SuDS%20Design%20Guidance%20(1).pdf [Accessed: 08/02/2023].

Ref. 9-42 Yorkshire Water (2020) Water Resources Management Plan. [Accessed 31/08/23]

Ref. 9-43 Natural England (2022). Natural England Water quality and nutrient neutrality advice (16-03-2022). Available at: https://publications.naturalengland.org.uk/publication/4792131352002560 [Accessed 31/08/23]

Ref. 9-44 Ordnance Survey Maps. Available at: https://www.bing.com/maps [Accessed: 13/02/2023].

Ref. 9-45 Aerial Photographic maps. Available at: https://www.bing.com/maps [Accessed: 13/02/2023].

Ref. 9-46 Environment Agency (2015). Humber River Basin Management Plan.

Ref. 9-47 Environment Agency. Catchment Data Explorer Tool. Available at: https://environment.data.gov.uk/catchment-planning/ [Accessed: 08/02/2023].

Ref. 9-48 British Geological Survey (2023). GeoIndex (onshore). Available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ [Accessed: 08/02/2023].

Ref. 9-49 DEFRA, Multi-Agency geographical information for the countryside (MAGIC). Available at: https://magic.defra.gov.uk/MagicMap.aspx [Accessed: 10 October 2023].

Ref. 9-50 National River Flow Archive. Available at: https://nrfa.ceh.ac.uk/data/search [Accessed: 13/02/2023].

Ref. 9-51 Natural England. Available at: https://www.gov.uk/government/organisations/natural-england [Accessed: 08/02/2023].

Ref. 9-52 Cranfield Soils and Agrifood Institute. Available at: https://www.landis.org.uk/soilscapes/ [Date accessed: 08/02/2023].

Ref. 9-53 Meteorological Office. Available at: https://www.metoffice.gov.uk/ [Accessed: 13/02/2023].

Ref. 9-54 Environment Agency, Water Quality Archive. Available at: https://environment.data.gov.uk/water-quality/view/landing [Accessed: 08/02/2023].
Ref. 9-55 Environment Agency, Fish and Ecology Data Viewer. Available at: https://environment.data.gov.uk/ecology/explorer/ [Accessed: 08/02/2023].
Ref. 9-56 UK Government. Flood Map for Planning. Available at: https://www.gov.uk/government/publications/flood-risk-maps-2019 [Accessed: 08/02/2023].
Ref. 9-57 UK Government. Long Term Flood Risk Mapping. Available at: https://www.gov.uk/check-long-term-flood-risk [Accessed: 08/02/2023].
Ref. 9-58 UK Government. Water Framework Directive assessment for a flood risk activity. Available at: https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity [Accessed: 21/02/2023].
Ref. 9-59 The Planning Inspectorate Advice Note 18: The Water Framework Directive Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-18/ [Accessed: 21/09/2023].
Ref. 9-60 Design Manual for Roads and Bridges. LA 113 – Road drainage and the water environment. Available at: https://standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727 [Accessed: 21/02/2023].
Ref. 9-61 Design Manual for Roads and Bridges. LA104- Environmental assessment and monitoring. Available at: https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a [Accessed: 21/02/2023].
Ref. 9-62 Environment Agency (1998a). River Geomorphology: a practical guide.
Ref. 9-63 Environment Agency (1998b). Geomorphological approaches to river management. Project record W5A/i661/1, prepared by Thorne, C., Downs, P.W., Newson, M.D., Clarke, M.J. and Sear, D.A., EA Bristol.
Ref. 9-64 Environment Agency (2023). Hydrology data explorer: Skelton. Available at: https://environment.data.gov.uk/hydrology/station/213d70b2-894b-406b-9dc3-31d3ccec7f54 [Accessed: 08/02/2023].
Ref. 9-65 Environment Agency (2023). Hydrology data explorer: Buttercrambe. Available at: https://environment.data.gov.uk/hydrology/station/605097d0-d67a-4e16-969a-e5fe8bbd7fd8 [Accessed: 08/02/2023].
Ref. 9-66 Environment Agency (2023). Hydrology data explorer: Holme House Farm. Available at: https://environment.data.gov.uk/hydrology/station/bce9c8be-26c4-40b1-b852-715b016440e5 [Accessed: 08/02/2023].
Ref. 9-67 North Yorkshire County Council (2004). Selby District Council and the Selby BAP Partnership. The Selby Biodiversity Action Plan.
Ref. 9-68 Environment Agency. Asset Management Database. Available at: https://environment.data.gov.uk/asset-management [Accessed: 08/02/2023].
Ref. 9-69 East Riding of Yorkshire (2019). Strategic Flood Risk Assessment. Available at: https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/strategic-flood-risk-assessment/ [Accessed: 08/02/2023].
Ref. 9-70 Selby District Council (2020). Strategic Flood Risk Assessment. Available at: https://www.selby.gov.uk/strategic-flood-risk-assessment-archive [Accessed: 08/02/2023].

Ref. 9-71 Environment Agency (2005). Dales Area Floodplain. Mapping Phase 2 Studies 2004. Lower Derwent. Volume 1: Main Report.
Ref. 9-72 Environment Agency. Check Long Term Flood Risk Service. Available at: https://check-long-term-flood-risk.service.gov.uk/map [Accessed: 08/02/2023].
Ref. 9-73 Environment Agency. Peak river flow climate change allowances by management catchment. Available at: https://www.gov.uk/government/publications/peak-river-flow-climate-change-allowances-by-management-catchment [Accessed: 08/02/2023].
Ref. 9-74 Environment Agency. Peak rainfall climate change allowances by management catchment. Available at: https://www.gov.uk/government/publications/peak-rainfall-climate-change-allowances-by-management-catchment [Accessed: 08/02/2023].
Ref. 9-75 NetRegs. NetRegs – Environmental guidance for your business in Northern Ireland and Scotland. Available at online:
Ref. 9-76 Environment Agency (2011). Pollution Prevention Guidance. Safe storage – the safe operation of refuelling: PPG7. Available at: https://www.netregs.org.uk/media/1673/ppg-7.pdf [Accessed: 08/02/2023].
Ref. 9-77 Environment Agency. Pollution Prevention Guidance. Managing fire water and major spillages: PPG18. Available at: https://www.netregs.org.uk/media/1674/ppg-18.pdf [Accessed: 08/02/2023].
Ref. 9-78 British Standards Institute (2009). BS6031:2009 Code of Practice for Earth Works.
Ref. 9-79 British Standards Institute (2013). BS8582 Code of Practice for Surface Water Management of Development Sites.
Ref. 9-80 CIRIA C741 (2015). Environmental good practice on site guide (fourth edition).
Ref. 9-81 CIRIA C648 (2006). Control of water pollution from linear construction projects, technical guidance.
Ref. 9-82 CIRIA C609 (2004). Sustainable Drainage Systems, hydraulic, structural and water quality advice.
Ref. 9-83 CIRIA C532 (2001). Control of water pollution from construction sites – Guidance for consultants and contractors.
Ref. 9-84 CIRIA C736F (2014) Containment systems for prevention of pollution.
Ref. 9-85 Control of Substances Hazardous to Health Regulations (2002). https://www.hse.gov.uk/nanotechnology/coshh.htm#:~:text=COSHH%20is%20the%20law%20that,to%20health%20(risk%20assessment)%3B [Accessed: 08/02/2023].
Ref. 9-86 HMSO (1991). Water Industry Act. Available at: https://www.legislation.gov.uk/ukpga/1991/56/contents [Accessed: 08/02/2023].
Ref. 9-87 Environment Agency (2023). Temporary dewatering from excavations to surface water: RPS 261. Available at: https://www.gov.uk/government/publications/temporary-dewatering-from-excavations-to-surface-water/temporary-dewatering-from-excavations-to-surface-water [Accessed: 08/02/2023].
Ref. 9-88 Environment Agency (2020) Land contamination risk management (LCRM). Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm [Accessed: 08/02/2023]
Ref. 9-89 British Standards Institute (2013b) BS10175:2011+ A2:2017 Investigation of Potentially Contaminated Sites: Code of Practice

Ref. 9-90 Environment Agency (2010) GPLC1 – Guiding principles for land contamination. Available at: https://www.claire.co.uk/index.php?option=com_content&view=article&id=192&catid=41&Itemid=256 [Accessed: 08/02/2023]

Ref. 9-91 Invasive Alien Species (Enforcement and Permitting) Order 2019. Available at https://www.legislation.gov.uk/uksi/2019/527/contents/made [Accessed: 26/09/23]

Ref. 9-92 Nitrate Pollution Prevention Regulations 2015. Available at https://www.legislation.gov.uk/uksi/2015/668/contents/made [Accessed: 26/09/23]

Ref. 9-93 UK Government Guidance [2023] Pollution Prevention for Business. Available at https://www.gov.uk/guidance/pollution-prevention-for-businesses [Accessed 12/11/23]