



Mallard Pass

Solar Farm

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Environmental Statement Volume 1 Chapter 11: Water Resources and Ground Conditions

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Table of Contents

11.0 Water Resources and Ground Conditions	11-1
11.1. Introduction.....	11-1
11.2. Baseline Conditions.....	11-5
11.3. Embedded Mitigation.....	11-23
11.4. Potential Effects	11-25
11.5. Proposed Additional Mitigation	11-48
11.6. Residual Effects	11-48
11.7. Monitoring Requirements	11-48
11.8. Cumulative Effects.....	11-48
11.9. Conclusion.....	11-59
11.10. References	11-65

List of Tables

Table 11-1 - Significance of Effect	11-3
Table 11-2: Long term average rainfall for Wittering Climate Station (1991 - 2020).....	11-6
Table 11-3: Private Water Supplies Scoped Out of Further Assessment..	11-18
Table 11-4: Private Water Supplies Scoped In for Further Assessment	11-19
Table 11-5: Statutory Designated Sites within 5 km of the Order limits	11-21
Table 11-6: Screening of WFD RBMP water bodies	11-31
Table 11-7: Screening of the Proposed Development Activities Against WFD Quality.....	11-32
Table 11-8: Designated Public Water Supplies Sourced from the Environment Agency	11-44
Table 11-9: Cumulative Developments	11-50
Table 11-10: Summary of Effects.....	11-60

11.0 Water Resources and Ground Conditions

11.1. Introduction

11.1.1. This chapter of the Environmental Statement (ES) presents an assessment of likely significant effects of the Proposed Development on water resources and ground conditions within the wider catchment. The chapter presents the methodology followed and provides a review of the baseline conditions and future baseline conditions in a defined study area of the Proposed Development and surrounding area. The chapter then presents the results of the assessment and the impact of the Proposed Development on the baseline environment to determine the anticipated magnitude of impact and significance of effect. Embedded mitigation measures are presented and where necessary additional mitigation measures, are discussed to minimise the effects of the Proposed Development to an acceptable level (i.e. to a minor or negligible effect), during the construction, operation and decommissioning phases.

Legislation, Planning Policy and Guidance

11.1.2. This assessment has been undertaken with regard to the following legislation, policy and guidance.

Legislation

- a. Water Framework Directive (2000/60/EC) as implemented in England via the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [**Ref 11-1**];
- b. The Groundwater Directive (GWD) (2006/118/EC) as implemented by the Groundwater (Water Framework Directive) (England) Direction 2016 [**Ref 11-2**];
- c. The Groundwater Daughter Directive to WFD (2006/118/EC) as implemented Environmental Permitting (England and Wales) Regulations 2016;

- d. The Bathing Water Directive (2006/7/EC) [**Ref 11-3**] as implemented by the Bathing Water Regulations 2013 [**Ref 11-4**];
- e. Flood and Water Management Act 2010 [**Ref 11-5**]; and
- f. Land Drainage Act 1991 [**Ref 11-6**].

National Planning Policy

- a. Overarching National Policy Statement (NPS) for Energy EN-1 [**Ref 11-7**];
- b. NPS for Renewable Energy EN-3 [**Ref 11-8**];
- c. NPS for Electricity Networks EN-5 [**Ref 11-9**];
- d. Draft NPS EN-1 [**Ref 11-10**];
- e. Draft NPS EN-3 [**Ref 11-11**]; and
- f. National Planning Policy Framework (NPPF) [**Ref 11-12**].

Local Planning Policy

- a. Rutland Core Strategy 2011 – 2026 (adopted 2011) [**Ref 11-13**];
- b. South Kesteven District Council Local Plan 2011 – 2036 (adopted 2020) [**Ref 11-14**]; and
- c. Joint Lincolnshire Flood Risk and Water Management Strategy 2019-2050 [**Ref 11-15**].

Guidance

- a. Planning Practice Guidance – Flood Risk and Coastal Change [**Ref 11-16**];
- b. The Construction Industry Research and Information Association (CIRIA) (2015), Environmental Good Practice on Site (C741) [**Ref 11-17**];
- c. CIRIA (2001), Control of Water Pollution from Construction Sites (C532) [**Ref 11-18**]; and

d. CIRIA The Sustainable Drainage System (SuDS) Manual (2015) [Ref 11-19].

11.1.3. Further detail on relevant legislation, policy and guidance pertinent to the Water Resources and Ground Conditions assessment is provided in **Appendix 11.1**.

Assessment Methodology

11.1.4. The Water Resources and Ground Conditions assessment follows the general approach to undertaking EIA, as detailed in **Chapter 2: Overview of the EIA process** of the ES, albeit it has been modified to take account of relevant industry guidelines and best practice (see above and **Appendix 11.1**).

11.1.5. The predicted significance of the effect is determined through a standard method of assessment and based on professional judgement, considering both the sensitivity of the receptor and the magnitude of the potential effect as defined in **Table 11-1**. Effects of moderate significance or greater are considered significant.

Table 11-1 - Significance of Effect

Magnitude of Effect	Sensitivity of Resource or Receptor		
	High	Moderate	Low
High	Major	Major	Minor
Moderate	Major	Major	Minor
Low	Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible

11.1.6. The methodology for attributing sensitivity of receptors, magnitude of impacts and the significance of effects in relation to water resources and ground conditions is described in **Appendix 11.2**.

Consultation

- 11.1.7. A summary of the consultation relating to water and ground resources is provided in **Appendix 11.3**, which sets out the main key matters raised by the stakeholders (including in the Scoping Opinion) and a description of how and where this matter has been addressed in the EIA and ES. The key issues to be considered within this assessment are:
- a. Potential chemical pollution effects on the hydrological environment;
 - b. Potential erosion and sedimentation effects on the hydrological environment;
 - c. Potential impediments to stream flow;
 - d. Potential effects on private water supplies;
 - e. Potential changes in soil interflow patterns;
 - f. Potential for the compaction of soils; and
 - g. Potential for an increase in runoff and flood risk.

Assumptions and Limitations

- 11.1.8. Weather conditions during the site walkovers (on 8th - 10th March and 1st - 2nd August, 2022) was changeable with extended periods of dry weather for the latter walkovers. The weather conditions are not considered to materially affect the understanding of the hydrological regime as watercourses and ditches were visible and flow observed.
- 11.1.9. Following two rounds of letter consultation and a walkover of the Order limits extent, it was not possible to obtain a response from all Private Water Supplies (PWS) identified by Rutland County Council (RCC) and South Kesteven District Council (SKDC). Regarding PWS Bowthorpe Park, where it was not possible to agree on the process for the resident supplying information on the specifics of the supply, information from the SKDC was used to inform the assessment.

11.1.10. With the exception of PWS consultation and walkover, all data considered necessary to identify and assess the likely significant effects was available.

11.2. Baseline Conditions

Study Area

11.2.1. The water resources and ground conditions core study area includes all areas where 'Site Works' is proposed as shown in **Figure 11.1**. A wider study area includes 5km around the core study area. Both study areas are shown on **Figure 11.1**. At distances greater than 5km within lowland catchments, it is considered that schemes such as a solar farm are unlikely to contribute to a hydrological effect, in terms of chemical or sedimentation effects, due to attenuation and dilution over distance of potentially polluting chemicals. A smaller 1km study area is based on the Order limits boundary and is used to assess PWS and PuWS (the WS Study Area) as shown in **Figure 11.1**. These study areas are defined based on professional judgement and experience assessing similar scale developments within lowland agricultural environments and similar hydrological catchments in England. Current Baseline

Topography and Land Use

11.2.2. The topography and land use of the Order limits, inferred from the desk-top study presented in this section of the chapter, was confirmed during the walkover on 1st and 2nd August 2022 to be arable agricultural land across the Order limits. The Order limits extent is generally low lying and flat, with land drains which drain fields to the larger watercourses.

Rainfall

11.2.3. The National River Flow Archive (NRFA) [Ref 11-20] reports Average Annual Rainfall (AAR) of 614mm at the Holywell Brook at Holywell gauging station, which is located approximately 53m north of the Order limits.

- 11.2.4. As monthly long term climate data is not freely available from the NRFA, long term average rainfall data (1991 to 2020) is obtained from the Meteorological Office at the Wittering climate station, which is located approximately 5.8km south of the Order limits. This is shown in **Table 11-2**

Table 11-2: Long term average rainfall for Wittering Climate Station (1991 - 2020)

Month	Jan	Feb	Mar	Apr	May	Jun
Rainfall (mm)	46.96	38.92	38.99	44.15	49.55	52.91
Month	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	55.51	59.86	52.85	63.34	57.50	53.01

Solid Geology

- 11.2.5. British Geological Survey (BGS) [Ref 11-21] mapping indicates that the Order limits is underlain by sedimentary rocks of the Inferior Oolite Group to the north-west, overlain by the Great Oolite Group in the centre, which is overlain by Ancholme Group to the south-west.
- 11.2.6. The Inferior Oolite Group includes formations of Upper and Lower Limestone of the Lincolnshire Limestone Formation.
- 11.2.7. The Great Oolite Group includes formations of Argillaceous rocks (subordinate sandstone and mudstone) of the Rutland Formation, Limestone of the Blisworth Limestone Formation, Mudstone of the Blisworth Clay Formation and Limestone of the Cornbrash Limestone Formation.
- 11.2.8. The Ancholme Group includes formations of Mudstone of Kellaways Clay, Sandstone and Siltstone of Kellaways Sand and Mudstone of the Oxford Clay Formation.
- 11.2.9. Several north-west to south-east faults are inferred to the west and south of the Order limits.

11.2.10. An illustration of solid geology is shown on **Figure 11.2**.

Superficial Geology

11.2.11. BGS superficial data does not record superficial deposits across a majority of the Order limits; however, where superficial deposits are present they comprise areas of Alluvium - clay, silt, sand and gravel, and areas of river terrace deposits – sand and gravel, in the centre of the Site. Furthermore, in the east and southern extent of the Order limits, there are areas of head – clay, silt, sand and gravel, and glaciofluvial deposits of mid Pleistocene sand and gravel.

11.2.12. During the walkover of the Order limits in August 2022, as a result of the dry weather the topsoil was very dry and cracked. It was observed to be gravelly sand deposits.

11.2.13. Infiltration testing (as outlined in **Appendix 11.6: Outline Surface Water Drainage Strategy**) has been conducted at the location of the Onsite Substation in March 2022 in seven locations, focussed at the Onsite Substation.

11.2.14. The report of the infiltration testing, **Appendix 11.6: Outline Surface Water Drainage Strategy**, summarised the findings of localised geology, strata conditions, groundwater and suitability of soakaways. Superficial River Terrace and alluvium were present to the north east of the Order limits. The majority solid geology underlying the Order limits was found to be Rutland Formation, with Upper Lincolnshire Limestone present to the north and Blisworth Limestone Formation to the south-west.

11.2.15. It was found that soakaways were not suitable to be implemented across the majority of the Order limits, due to the low infiltration rate, with the exception of the north of the Order limits where soakaways within the River Terrace Deposits could be utilised.

11.2.16. An illustration of superficial geology is shown on **Figure 11.3**.

Contaminated Land

- 11.2.17. The Environment Agency Historic Landfill Sites dataset [**Ref 11-22**] identifies that no active landfill sites are present within the Order limits.
- 11.2.18. Historic mapping (see **Appendix 11.4**) indicates the presence of several former gravel pits and two former landfill sites within the southern area of the Order limits. One of the former landfill sites is recorded as accepting household waste while the other is a Local Authority Landfill site recorded as accepting dry domestic and construction waste which was operational until 1979.
- 11.2.19. Historical mapping [**Ref 11-23**] also indicates that the centre of the Order limits is located on land that was used for the quarrying of sand and clay. Similarly, there are several disused gravel and stone pits in the northern extent of the Order limits which is also in close proximity to areas of landfilling, with the potential for contamination which could migrate to the Order limits.
- 11.2.20. The East Coast Mainline railway line bisects the Order limits in a northwest to southeast orientation, while remnants of the dismantled Great Northern Railway - Essendine and Bourne Branch remain within the northern area of the Order limits and has the potential for sources of contamination.
- 11.2.21. The Envirocheck report [**Ref 11-24**] identifies that the Order limits is recorded as being within Intermediate and Higher probability radon area where radon protective measures are necessary in the construction of any new buildings.

Hydrogeology

- 11.2.22. The BGS Geindex 1:625,000 Hydrogeology map [**Ref 11-25**] shows that the Order limits is underlain by aquifers of the Inferior Oolite Group, the

Great Oolite Group and the Kellaways Formation and Oxford Clay Formation.

- 11.2.23. The BGS Geindex 1:625,000 Hydrogeology map shows that the north-west extent of the Order limits is underlain by the Inferior Oolite Group, a ‘highly productive aquifer’ where flow is virtually all through fractures and other discontinuities and is described as *“yielding up to 40l/s in Lincolnshire. Copious springs at outcrops, and is brackish at confined depths”*.
- 11.2.24. The central section of the Order limits is underlain by the Great Oolite Group, a ‘moderately productive aquifer’ where flow is virtually through all fractures and other discontinuities. This is described as a significant limestone aquifer producing large yields.
- 11.2.25. The eastern extent of the Order limits is underlain by the Kellaways Formation and Oxford Clay Formation aquifer. Its character is described as *“rocks with essentially no groundwater”* which is due to *“largely clays confining underlying aquifers. Kellaways Sand near base yields small quantities, often brackish”*.
- 11.2.26. Information provided by the Environment Agency (EA) available on the Defra Multi-Agency Geographic Information for the Countryside (MAGIC) Map [Ref 11-26] viewer shows that the Order limits lies outside a Drinking Water Safeguard Zone for surface water.
- 11.2.27. There are two large Zone I Inner Protection Zones located within the boundaries of the Order limits, to the north-east and south. The associated Zone II Outer Protection Zone is also located within the Order limits. The Zone II to the north is extensive across the north and west of the Order limits. The Zone II to the south also extends over the south of the Order limits. The source to the south also has a Zone III Total Catchment Zone which covers a small area to the south-east of the Order limits.

- 11.2.28. The EA 'Catchment Data Explorer' [Ref 11-27] shows that most of the Order limits overlies the groundwater body Welland Mid Jurassic Unit waterbody which has an overall status of 'Good'. The Welland Limestone Unit A is located to the east of the Order limits and has an overall status of 'Poor'. The Welland Lower Jurassic Unit waterbody to the west has an overall status of 'Good'.
- 11.2.29. Infiltration testing was conducted by Rogers Geotechnical Services in March 2022 at the location of the Onsite Substation. The test pit logs indicate that geology at the Onsite Substation comprises top soils underlain by clay-based strata to depths of 2.6 m below ground level (bgl), with no groundwater struck within the pits, suggesting groundwater is not close to the surface.
- 11.2.30. BGS borehole records (BGS ID: 467751: BGS Reference: TF01SE17) in the centre of the Order limits show groundwater was struck at 13m bgl, at 6m bgl in proximity to the railway line in the north west of the Order limits (BGS ID: 467852: BGS Reference: TF01SW7) and at 24m bgl (BGS ID: 467760: BGS Reference: TF01SE26) north of the railway line in the north of the Order limits.

Surface Hydrology

- 11.2.31. The West Glen River flows from north-west of the Order limits before flowing east then south and bisecting the centre of the Order limits, culverted under the East Coast Mainline railway line 30m east of the Order limits and again within the Order limits as shown in **Figure 11.1**. It then flows eastwards and joins the River Welland.
- 11.2.32. The River Gwash is located approximately 50m south of the Order limits and flows in an eastwardly direction, adjacent to the A6121, before meandering south and draining into the River Welland, approximately 955m south of the Order limits.

- 11.2.33. The East Glen River is located approximately 86m north-east of the Order limits, flowing south before joining the West Glen River.
- 11.2.34. There is a small unnamed watercourse (potentially modified) in the north-west extent of the Order limits, west of Vale Farm.
- 11.2.35. There is a small unnamed pond, approximately 17,000m² in area, immediately adjacent to the Order limits which is connected to the West Glen River.
- 11.2.36. The EA 'Catchment Data Explorer' shows that the Order limits lies within three waterbody catchments; The West Glen – confluence West Glen tributary to confluence East Glen River waterbody catchment (ID GB105031050770), the East Glen River waterbody catchment (ID GB105031055480) and the Gwash waterbody (ID GB105031050610). All of these waterbodies are located within the Welland Management Catchment. The West Glen and Gwash waterbodies have an ecological status of 'Moderate'. The East Glen waterbody has an ecological status of 'Poor'.
- 11.2.37. **Figure 11.1** shows the main surface watercourses and their associated catchments within the Order limits.

Site Drainage

- 11.2.38. A hydrology walkover was conducted in March and August 2022 to identify the drainage characteristics of the Order limits.
- 11.2.39. The Order limits is shown to be predominantly served by a network of anthropologically made cross drainage ditches typical of agricultural land.
- 11.2.40. Drains within the Order limits are assessed to feed into the wider catchment served by the East Glen River.

- 11.2.41. Site observations and anecdotal evidence indicates that the Order limits is drained by a network of subsurface drainage pipes.

Hydrological Regime and Surface Water Morphology

- 11.2.42. The hydrological regime within the Order limits is typical of lowland agricultural plains and is drained by man-made ditches of slow running water; however, the Order limits is not located within the catchment of an Internal Drainage Board (IDB). These ditches drain to several natural watercourses and in turn the wider hydrological system.
- 11.2.43. Consultations with Lincolnshire County Council (LCC) have confirmed that LCC have a memorandum of understanding with Internal Drainage Boards (IDBs) within the area to extend their operational ownership across the whole of Lincolnshire. The Order limits are shown to fall within the extended management boundaries of the Black Sluice and Upper Whitham IDB. Consultations with LCC has confirmed that IDB consents and byelaws are not applicable for the extended operational areas which the Order limits falls within.

Surface Water Continuity

- 11.2.44. Surface drainage ditches at the Order limits appear to be relatively continuous and free from natural blockages (such as trees / brash), although some ditches are heavily vegetated or stagnant, promoting the growth of weeds.
- 11.2.45. Several manmade flow controls and crossings were observed along the watercourses within the Order limits to support access for agricultural and the adjacent railway line, as shown in Plates 11.1 and 11.2.

Plate 11.1: Watercourse Crossings within the Order limits (West Glen River at E 504909, N 312076)



Plate 11.2: Watercourse Crossings within the Order limits (Land Drain at E 505939, N 312244)



Flooding

- 11.2.46. The Order limits is primarily located within Flood Zone 1, an area classed as having a low probability of flooding. The eastern and southern extents of the Order limits are located adjacent to the West Glen River, an area within Flood Zone 3 (see **Figure 11.4**), and which is described by the EA as having a 'high probability' of river and surface water flooding in the Planning Practice Guidance (NPPG) 'Flood Risk and Coastal Change', Table 1 (Paragraph: 077 Reference ID: 7-077-2022082), published by the Ministry of Housing, Communities and Local Government (now the Department for Levelling Up, Housing and Communities) in 2014 and updated in August 2022 [**Ref 11-16**].
- 11.2.47. There are minor areas within the Order limits, either side of the West Glen River, which are classified as Flood Zone 3b, as outlined in Section 2 of **Appendix 11.5: FRA**.
- 11.2.48. The EA Flood Map for Planning [**Ref 11-29**] indicates the Order limits does not benefit from the protection of flood defences.
- 11.2.49. The Defra Spatial Flood Defences dataset (Defra, 2022) [**Ref 11-30**] indicates flood defences are located along the banks of the River Gwash and the West Glen River, which have not yet been considered as part of the EA Flood Map for Planning.
- 11.2.50. Defences along the River Gwash are located approximately 600m west of the Order limits and comprise privately owned engineered high ground. The flood defence is shown to have crest levels in the range of approximately 19.1 to 29.5m above ordnance datum (AOD) and a Standard of Protection (SoP) of 25 years.

Plate 11.3: Embankments along the River Gwash (Land Drain at E 504206, N 310399)



- 11.2.51. Defences along the West Glen River run along the banks of the watercourse through the centre of the Order limits and comprise privately owned natural high ground. The flood defence is shown to have crest levels in the range of approximately 13.6m to 21.8m AOD and a SoP of 50 years.

Public Water Supplies

- 11.2.52. Consultation with Anglian Water and the EA [Ref 11-31] was carried out on 16th February 2022 to identify public water abstractions within 1km of the Order limits, as per the Water Supplies (WS) Study Area.
- 11.2.53. A response from the EA [Ref 11-32] was received on 10th March 2022 detailing licensed abstractions within the WS Study Area. They also provided details and locations for each, some of which are multiple point abstractions for a single purpose:

- a. Kingfisher House, EA: surface water source River Gwash at Ryhall, used as Transfer Between Sources (Pre Water Act 2003) located 619m downstream of the Order limits at TF 04100 10700;
- b. Belmesthorpe Lane, River Gwash Trout Farm Ltd: surface water source River Gwash at Ryhall, used as Fish Farm / Cress Pond Throughflow located 612m downstream of the Order limits at TF 03985 10807;
- c. HE Parkinson, Manor Farm: surface water source River Glen at Essendine, N. Lodge, used as Spray Irrigation – Located within or immediately beside the Order limits at TF 04000 13400 and TF 05000 12700; and
- d. HE Parkinson, Manor Farm: surface water source River Glen, Broadholme Farm, used as Spray Irrigation – Located within or immediately beside the Order limits at TF 05000 11700 and TF 05900 11000.

11.2.54. A response from Anglian Water was received on 4th July 2022 with a map showing the locations of six abstractions grouped in two locations beyond the north-east and south-east of the Order limits. As the abstractions grouped to the south-east are outside the WS Study Area, these are scoped out of further assessment.

11.2.55. A follow up request for water abstraction rates, co-ordinates and borehole depths was issued and a response was received from Anglian Water on 29th July 2022. From the information received the four boreholes, they are likely to source from the Lincolnshire Limestone bedrock, according to log from nearby BGS Borehole TF01SE43.

11.2.56. Public Water Supplies are shown on **Figure 11.5**.

Private Water Supplies

- 11.2.57. Consultation with RCC and SKDC [Ref 11-33, Ref 11-34] was carried out on 16th February 2022 to identify PWS located within the WS Study Area.
- 11.2.58. RCC confirmed three PWS within 1km of the Order limits:
- a. North Lodge: Borehole source, located immediately within the Order limits at TF 05270 10935;
 - b. Tickencote Warren: Borehole source, located approximately 392m east of the Order limits at SK 97900 11260; and
 - c. Tickencote Hall: Surface water source, located approximately 780m north west of the Order limits at SK 98900 09410.
- 11.2.59. SKDC confirmed three PWS, which supply five properties within 1km of the Order limits. One PWS supplies Banthorpe Lodge, Kettles Barn, The Stables and Glen Lodge. Spa Cottage was noted by SKDC to be unoccupied. They also provided details of the source type of the PWS which was confirmed through consultation:
- a. The Stables, Borehole source, located approximately 192m east of the Order limits at TF 06166 10999;
 - b. Banthorpe Lodge, Borehole source, located approximately 210m east of the Order limits at TF 06200 11000;
 - c. Kettles Barn, Borehole source, located approximately 210m east of the Order limits at TF 06188 10989;
 - d. Glen Lodge: Borehole source, located approximately 222m east of the Order limits at TF 06209 10971; and
 - e. Spa House: Borehole source, located approximately 1km north of the Order limits at TF 07050 14600.

- 11.2.60. Spa Lodge Farm has also been contacted in addition to those confirmed by SKDC due to its close proximity to coordinates provided of the Spa House PWS.
- 11.2.61. Letters were first issued to the identified properties on 2nd March and 7th April 2022. Where responses were not received a second letter was issued on 13th July 2022. A site visit was then undertaken to validate information provided or attempt to contact residents where no response had been received.
- 11.2.62. During the hydrology walkover on 1st and 2nd of August 2022 it was possible to visit Tickencote Warren Farm and North Lodge (renamed as Goose Lodge) where the source and location of PWS was confirmed. During consultation residents at Goose Lodge stated that North Lodge Farm has an existing borehole supply which was a previous shared supply, and that the property is derelict.
- 11.2.63. Based on the information provided by RCC and SKDC, PWS were scoped in or out of further assessment, summarised in **Table 11-3** and **Table 11-4**. The location of the PWS are shown on **Figure 11.5**.

Table 11-3: Private Water Supplies Scoped Out of Further Assessment

PWS Source Name	PWS Supply	Source Type	Distance from Project Boundary	Hydro - logically Connected to the Project	Comment
Tickencote Hall	Tickencote Lodge Farm House	Surface Water	780m north west	No	No response from resident. Source located upstream of the Project.
Spa House	Spa House	Borehole 36.5m depth	1.0km north	No	No response from resident. Scoped out due to distance from

PWS Source Name	PWS Supply	Source Type	Distance from Project Boundary	Hydro - logically Connected to the Project	Comment
					Order limits and borehole depth.
N/A	Spa Lodge Farm	Water Mains	Supply located 1.0km north	No	Resident confirmed property is supplied by Water Mains.

Table 11-4: Private Water Supplies Scoped In for Further Assessment

PWS Source Name	PWS Supply	Source Type	Distance from Project Boundary	Hydro - logically Connected to the Project	Comment
North Lodge	Goose Lodge	Borehole 30m depth	15m west.	Yes	Sources from Lincolnshire Limestone.
North Lodge Farm	North Lodge Farm	Borehole 10m depth	Located immediately west.	Yes	Information provided by residents of Goose Lodge. Noted to be derelict but of shallow depth.
Tickencote Warren	Tickencote Warren	Borehole 55m depth	223m north east.	Yes	Source located within 250m Order limits.
Banthorpe Lodge	Banthorpe Lodge Kettles Barn The Stables, Glen Lodge	Borehole 27m depth (resident information) to 38m (SKDC information)	139m south.	Yes	Borehole located at Banthorpe Lodge.

Abstractions and Discharge Consents

- 11.2.64. Records of surface and groundwater abstraction points are held by the EA within the Order limits and in the near vicinity; however, the vast majority of these are for industrial and agricultural use with abstraction points for potable use confined to the north-western extent of the Order limits, as well as one within the central area of the Order limits.
- 11.2.65. There are seven discharge consents recorded onsite with a further 16 recorded within 250m of the Order limits. Of the seven onsite, five are recorded at the Essendine Terminal Pumping Station on Bourne Road, adjacent to Essendine Industrial Estate with Anglian Water Services Limited recorded as the operator. The consents are dated between 1969 and 2020 with the property type recorded as Pumping Station on Sewerage Network (Water Company). Discharge type recorded within the consents include Sewage Discharges - Storm Sewage Overflow - Storm tank/emergency overflow - Pumping Station - Water Company, with discharge into a watercourse recorded as Freshwater Stream/River. Another discharge consent is recorded on Essendine Road in the western extent of the Order limits with Towells Haulage Limited as the operator. The consent was effective between 1979 and 1996 with discharge onto land and the discharge type unknown.
- 11.2.66. The final discharge consent on the Order limits is an operational consent in the eastern extent of the Order limits. This is an Environmental Permit, which allows the release of treated wastewater or effluent to the environment.

Designated Receptors

- 11.2.67. There are 18 statutory designations relating to water within 5 km of the Order limits, identified through the use of Natural England and the Joint Nature Conservation Committee (JNCC) GIS datasets [**Ref 11-35, Ref 11-36**], as listed in **Table 11-5**.

Table 11-5: Statutory Designated Sites within 5 km of the Order limits

Designated Site	Distance and Direction from the Order limits	Hydrologically Linked to Order limits?
Ryhall Pastures and Little Warren Verges SSSI	Located onsite.	Yes – Partially located within the Order limits boundary and hydrologically connected by field drain.
Newell Wood SSSI	Approximately 34m north-west of the Order limits.	No – Hydrologically disconnected. Is located upslope of the Order limits and is disconnected by an unclassified road providing a hydrological barrier and an unnamed surface watercourse.
Great Casterton Road Banks SSSI	Approximately 91m south of the Order limits.	No - Hydrologically disconnected by the River Gwash.
Bloody Oaks Quarry SSSI	Approximately 460m south-west of the Order limits.	No – Hydrologically disconnected by A1 and existing drainage infrastructure.
Tickencote Marsh SSSI	Approximately 1.17km west of the Order limits.	No – Hydrologically disconnected by road network providing a hydrological barrier, intervening topography and the River Gwash.
East Wood, Great Casterton SSSI	Approximately 1.39km south of the Order limits.	No – Hydrologically disconnected by intervening topography and an unnamed watercourse located north of the receptor.
Clipsham Old Quarry and Pickworth Great Wood SSSI	Approximately 1.98km north-west of the Order limits.	No - Hydrologically disconnected by intervening topography and road network providing a hydrological barrier.
Shackwell Hollow SSSI	Approximately 2.21km south-west of the Order limits.	No – Hydrologically disconnected by road network providing a hydrological barrier, intervening topography and the River Gwash.
Staton's Pit Local Nature Reserve (LNR)	Approximately 3.06km north of the Order limits.	No – Hydrologically disconnected by intervening topography, surface water features including a network of field drains and the West Glen River, and road network providing a hydrological barrier.
Dole Wood Site of Special Scientific Interest (SSSI)	Approximately 3.54km north-east of the Order limits.	No – Hydrologically disconnected by intervening topography, surface water features including a network of field drains

Designated Site	Distance and Direction from the Order limits	Hydrologically Linked to Order limits?
		and the East Glen River, and road network providing a hydrological barrier.
Langtoft Gravel Pits SSSI	Approximately 3.6km east of the Order limits.	No - Hydrologically disconnected by West Glen River and network of field drains and roads providing a hydrological barrier.
Empingham Marshy Meadows SSSI	Approximately 3.89km west of the Order limits.	No – Hydrologically disconnected by two unclassified roads providing a hydrological barrier, and intervening topography.
Banark Hills and Holes SSSI, SAC, National Nature Reserve (NNR)	Approximately 3.93km south-east of the Order limits.	No – Hydrologically disconnected by road network providing a hydrological barrier, intervening topography and the River Welland.
Ketton Quarries SSSI	Approximately 4.08km south-west of the Order limits.	No – Hydrologically disconnected by road network providing a hydrological barrier and intervening topography.
Castle Bytham Quarry SSSI	Approximately 4.41km north-west of the Order limits.	No - Hydrologically disconnected by intervening topography, road network providing a hydrological barrier, and the West Glen River.
Baston and Thurlby Fens SSSI, Special Protection Area (SAC)	Approximately 4.46km north-east of the Order limits.	No – Hydrologically disconnected by intervening topography, surface water features including a network of field drains and the East Glen River, and road network providing a hydrological barrier.
Whitewater Valley SSSI	Approximately 4.63km south of the Order limits.	No – Hydrologically disconnected by road network providing a hydrological barrier, intervening topography and the River Welland.
Grimsthorpe Park (SSSI, SAC)	Approximately 4.67km north of the Order limits.	No – Hydrologically disconnected by intervening topography, surface water features including a network of field drains and the West Glen River. The road network also creates a hydrological barrier.

11.2.68. With the exception of Ryhall Pastures and Little Warren Verges SSSI, all hydrologically dependent designations are considered to be hydrologically

disconnected from the Order limits, or are of sufficient distance to remain unaffected by the Proposed Development. As such, effects on designations have been scoped out of this assessment, with the exception of Ryhall Pastures and Little Warren Verges SSSI.

Future Baseline

- 11.2.69. The future baseline of the Order limits without the implementation of the Proposed Development would be unlikely to change. The Order limits would continue to be intensively managed for agricultural purposes. In addition, irrespective of the implementation of the Proposed Development, other permitted developments outside of the Order limits are likely to be ongoing. These Developments are listed on the **Cumulative Effects Long List** provided in **Appendix 2.4**, and shown on **Figure 2.1**
- 11.2.70. Without the Proposed Development the baseline is unlikely to change significantly, however, there would be a natural evolution, including as a result of climate change. This may include impacts on rainfall, watercourse quality and levels and flood risk.

11.3. Embedded Mitigation

- 11.3.1. The following mitigation measures relating to the hydrological environment are embedded (secured through the **Works Plans [EN010127/APP/2.2]** and **Design Guidance** within the **Design and Access Statement [EN010127/APP/7.3]**) into the design and construction of the Proposed Development:
- a. 50m watercourse buffers for major construction works (i.e. compound) with the exception of watercourse crossings along access tracks; and
 - b. 10m watercourse buffers for minor construction works (i.e. solar panel installation) with the exception of watercourse crossings along access tracks;

- c. The Proposed Development will utilise existing access road and tracks already in place at this location, this will help to minimise ground disturbance and requirement for further watercourse crossings.
- 11.3.2. The fields within the Order limits are used for arable farming. The Proposed Development does not include the application of nitrates to the land, which is carried out periodically via the current land use, and this may lead to improvements in water quality compared to the baseline scenario.
- 11.3.3. Onsite access tracks will follow the alignment of the existing agricultural tracks, where possible, limiting the requirement for new drainage ditch crossings, disturbance to soils and habitat removal. The internal access tracks will be constructed of compacted stone with excavation kept to a minimum.
- 11.3.4. Where drainage is required, a ditch or a swale, with check dams, may be located downhill of the internal access track to control any potential for surface water run-off. An **outline Surface Water Drainage Strategy (Appendix 11.6)** which is secured through the DCO Requirements, provides further details on the measures to control surface water within the Order limits.
- 11.3.5. The Proposed Development has been sequentially designed to locate all electrically sensitive infrastructure (e.g., the Onsite Substation and Solar Stations) outside of Flood Zones 2 and 3 to mitigate against the risk of flooding, as secured through the **Design Guidance** within the **DAS**.
- 11.3.6. Further mitigation measures are set out within the **outline Construction Environmental Management Plan (oCEMP) [EN010127/APP/7.6]**, **outline Operational Environmental Management Plan (oOEMP) [EN010127/APP/7.7]**, **outline Water Management Plan**

[EN010127/APP/7.13], and outline Decommissioning Environmental Management Plan (oDEMP) [EN010127/APP/7.8].

- 11.3.7. The environmental management plans comprise good practice methods and works that are established and effective measures to which the Applicant will be committed through the development consent.
- 11.3.8. The **oWMP** which describes water management measures to control surface water runoff and drain hardstanding and other structures during the construction, operation and decommissioning of the Proposed Development and will form part of a Pollution Prevention Plan (PPP) which will be incorporated into the CEMP (based on the **oCEMP**), which is secured through the DCO requirements and will have to be approved by the local planning authority in consultation with the EA prior to commencement of the construction phase.
- 11.3.9. The PPP will set out measures to be employed to avoid or mitigate potential pollution for all phases of the development, and will also include an Incident Plan to be followed should a pollution event occur. This plan will be produced following consultation and agreement with EA and all appropriate personnel working on the construction site will be trained in its use. The Construction Project Manager will have specific responsibility for implementation of the CEMP.
- 11.3.10. Method statements will also be applied, which will follow the principles laid out in relevant CIRIA guidance and the principles of the archived EA Pollution Prevention Guidelines [Ref 11-37].

11.4. Potential Effects

- 11.4.1. This section describes the potential water resources and ground conditions effects during the construction, operation and decommissioning phases of the Proposed Development. The embedded mitigation measures as described within **Chapter 5: Project Description** of this ES, have been

considered as part of the Proposed Development, when considering the potential effects of the Proposed Development.

Assessment of Potential Effects

- 11.4.2. The potential effects of the Proposed Development on hydrological receptors have been considered for the construction, operation and decommissioning phases. Effects occurring during construction and decommissioning are considered to be short term effects, with those occurring as a result of the operational phase considered to be long term effects.

Potential Construction Effects

- 11.4.3. The nature and magnitude of effects that could result from construction activities, as described in **Chapter 5: Project Description**, are assessed in the following paragraphs, which includes:
- a. The use of existing access tracks from the current agricultural operations for the construction of the Development;
 - b. Installation of the Mounting Structures;
 - c. Construction of a new access tracks, hardstandings, security fencing, CCTV masts, and Solar Stations;
 - d. Construction of the Onsite Substation foundations and a temporary construction compounds; and
 - e. Installation of cabling.

Construction

- 11.4.4. The assessment of the nature and magnitude of effects that could result from construction activities, is based on the parameters plans and **Projection Description** within **Chapter 5** of the ES.

Chemical Pollution

- 11.4.5. Potential effects involved with the management of construction are more a risk management issue, with the effects being assessed should the risk be realised. Should the Proposed Development proceed as described in **Chapter 5: Project Description** of the ES and in accordance with the **oCEMP**, **oOEMP** and **oDEMP**, i.e., with no spills, there would be no effects.
- 11.4.6. Potential risks include the spillage or leakage of chemicals, fresh concrete, foul water, fuel or oil, during use or storage onsite. These pollutants have the potential to adversely affect soils, subsurface water quality, soils, surface water quality, and groundwater, and hence effects on the biodiversity of receiving watercourses.

Surface Watercourses

- 11.4.7. Watercourses and drainage ditches could be at risk from a pollution incident during construction and these receptors are considered to be of high sensitivity.
- 11.4.8. Buffer distances between proposed construction works and watercourses and drainage ditches have been implemented to reduce the potential for chemical pollutants to be transferred to the water environment.
- 11.4.9. Measures such as absorbent spill pads / kits and other measures highlighted within the **oWMP** will effectively limit the uncontained release of chemicals to minor fugitive releases (if at all). These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.
- 11.4.10. Consultation responses from Greatford Parish Council requested that chemical pollution from damaged PV Modules / leakages from the PV Modules should be assessed. Arcus has undertaken site walkovers on

operational solar farms where vandalism has resulted in the PV Module surface being breached through impact from projectiles, as shown in Plate 11.4.



Plate 11.4: Vandalised PV Arrays, Thorne Solar Farm, Doncaster (as-built survey, L. Nevins 2016)

- 11.4.11. Due to the composition of the surface of the PV Modules, they are likely to remain intact both at the surface and underside near the racking system, even in the event of damage / impact and not leak. As such, there is limited potential to transfer chemicals to the hydrological environment.
- 11.4.12. Therefore, this would represent a Negligible magnitude of impact on watercourses and drainage ditches of **High Sensitivity** and therefore result in a **Negligible** significance of effect. This is considered **Not Significant**.
- 11.4.13. As such there will be no effect on Ryhall Pastures and Little Warren Verges SSSI and is **Not Significant**.

WFD Assessment

- 11.4.14. The Proposed Development is located within the catchment of the West Glen River.
- 11.4.15. This assessment is based on the source-pathway-receptor model and identifies the potential pollutant linkages between the sources identified in the screening process on the receptors identified in the scoping process.
- 11.4.16. The assessment considers the potential for the Proposed Development to have an adverse effect on the water quality of the identified WFD water bodies only.
- 11.4.17. The assessment is desk-based and the sources of information used to inform each stage of the assessment are outlined in the following sections.

Screening

- 11.4.18. The screening process identifies the potential sources of pollution that could cause a deterioration in water quality of the WFD water body. All identified activities and components related to the Proposed Development are identified and those which are not considered to cause effect to water body water quality are 'screened-out'. All other activities which are considered to have potential to cause effect are 'screened-in' and considered in the scoping stage.

Scoping

- 11.4.19. The scoping process identifies the risks of the 'screened-in' activities to potential receptors.
- 11.4.20. The WFD water bodies which are hydrologically connected to the Proposed Development, either directly or in-directly, are identified. Indirectly connected being water bodies that are connected to the Proposed Development via other water bodies e.g. downstream water bodies.

- 11.4.21. The WFD Assessment considers potential risks on the following components of the WFD water body receptors:
- a. The West Glen River.
- 11.4.22. This assessment will consider the risks to water quality and hydromorphology of receptors only.
- 11.4.23. The scoping assessment has been conducted in line with EA scoping template form¹.
- 11.4.24. The following sources of information were consulted to obtain information on WFD water body receptors:
- a. The EA Catchment Data Explorer; and
 - b. EA baseline water quality data (WIMS) [Ref 11-38].

WFD water bodies

- 11.4.25. The Proposed Development is located within the Anglian river basin management plan (RBMP). It is located within the operational catchment of the West Glen River.
- 11.4.26. The WFD water bodies are identified as being in hydrological connectivity with the works of the Development:
- a. West Glen River (GB105031050770).
- 11.4.27. The current WFD status, water quality classification and future objectives of the screened-in RBMP water bodies are detailed in **Table 11-6**.

¹ Environment Agency (2017) Scoping Template [Online] Available at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> (Accessed: 14/11/2022)

Table 11-6: Screening of WFD RBMP water bodies

	West Glen River
Waterbody ID	GB105031050770
Hydro-morphological designation	not designated artificial or heavily modified*
Overall water body classification (2019) – Cycle 3	Moderate
Ecological classification (2019) – Cycle 3	Moderate
Chemical classification (2019) – Cycle 3	Fail
Priority substances	Good
Priority hazardous substances	Fail
Overall Status Objective	Good by 2027
Reasons for not achieving good status (RNAG)	11 Reasons including diffuse source pollution and groundwater abstraction
Screening	Screened-in: WFD water body may be directly impacted by the Proposed Development as construction activities which could interact with the local watercourse network during the construction, operation and decommissioning phases.

**It should be noted that the Wet Glen River is canalised through the central section of the Order limits and is therefore heavily modified in terms of morphology.*

Table 11-7: Screening of the Proposed Development Activities Against WFD Quality

Development Component	Activity	Description of water quality risk	Screening Outcome
PV Arrays and Mounting Structures	<p>PV Modules will be secured to Mounting Structures with supporting legs above the ground. This avoids the creation of impermeable surfaces on the ground or the need for extensive earthworks.</p> <p>PV Arrays will not be located within 10m of the edge of main watercourses and 6m of ditches. Mounting Structures will likely be galvanised steel or Anodised aluminium poles driven into the ground; indicative maximum depth of 2.5m.</p>	<p>Installation of PV Arrays will not involve the creation of hardstanding at ground level meaning superficial cover for the Proposed Development will remain largely the same as the baseline. Additionally, the PV Tables will have rainwater gaps to prevent water being concentrated along a single drip line and appropriate planting beneath the panels to disperse drips.</p> <p>Techniques to manage surface water will be used to control runoff based on rural SuDS (RSuDS). Measures set out in the oWMP and the outline Surface Water Drainage Strategy (Appendix 11.6) will manage surface water within the Order limits through slowing surface water by interception in grassland in order to drain the Order limits as per the baseline scenario. In addition, the risk of agricultural diffuse pollution would be reduced from the change in land use as the application of fertilisers and agro-chemicals to crops, will no longer take place within the Solar PV Site. Therefore, there are no anticipated negative effects to surface water bodies from the PV Arrays and Mounting Structures.</p>	Screened out
Solar Station	<p>The Solar Stations could comprise an inverter, a transformer, and switchgear.</p>	<p>Solar Stations will not be located within 10m of a main watercourse and 6m of a drainage ditch, and therefore there is limited potential for effects to surface water bodies.</p> <p>Embedded good practice measures outlined in the oWMP, such as cut off ditches, will further limit the potential for the installation of Solar Stations to contribute to sedimentation or chemical effects on surface water receptors.</p>	Screened out

Development Component	Activity	Description of water quality risk	Screening Outcome
Onsite Substation and ancillary buildings	<p>The Onsite Substation will include transformers and switchgear semi-permeable subbase area</p>	<p>Infrastructure will not be located within 10m of a main watercourse and 6m of a drainage ditch, so there are no mechanisms for hydromorphological impacts to surface water bodies.</p> <p>Surface water run-off from the compound areas will be drained by a formal SuDS system.</p> <p>Given the outline Surface Water Drainage Design (Appendix 11.6), the outfalls of which are considered separately below, no impacts to WFD quality elements are expected.</p>	<p>Screened out</p>
Access tracks	<p>It is proposed to utilise the existing agricultural access routes that traverse the Order limits, where possible.</p> <p>Construct additional aggregate access tracks, where required.</p> <p>There may be requirement to improve (e.g. strengthening, minor extensions) existing ditch crossing culverts.</p>	<p>Culvert locations will fall within the catchment of the West Glen River. It should be noted that the WFD designated watercourse would not be culverted.</p>	<p>Screened out</p>

Development Component	Activity	Description of water quality risk	Screening Outcome
Cables – HDD under West Glen River	The cable corridor will cross the West Glen River, by an underground technique, i.e. directional drilling to install the cable a minimum of 1.5m beneath the channel bed. Launch and receive pits would be dug either side of the water body from which the cable would be installed.	<p>Direct effects to the West Glen River and riparian zone will be avoided by the use of HDD. Indirect effects from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling clays (e.g. water-based bentonite) will be managed with measures set out in the oCEMP and oWMP.</p> <p>HDD is unlikely to interact with the phreatic zone of the West Glen River due to the depth of groundwater below the surface (see BGS borehole records).</p>	Screened out
Surface water outfalls	The Onsite Substation SuDS will require an outfall.	<p>Surface water outfalls can impact the hydromorphological quality and water quality of the surface water bodies.</p> <p>Existing drainage outfalls discharging to the West Glen River (see Plate 3 of the Outline Surface Water Drainage Strategy (Appendix 11.6)) were observed and it is anticipated that these can be used to connect the SuDS system with a flow restriction device, preventing the need for in-channel works.</p>	Screened out

- 11.4.28. Following implementation of embedded mitigation measures, there is considered to be no deterioration of the WFD status of the West Glen River as a result of activities associated with the Proposed Development.
- 11.4.29. As the design includes measures to minimise the potential for chemical release and enhanced erosion protection measures (grass / wildflower mix), it is considered the Proposed Development will have positive effects which result in improvement of the adjacent water body (West Glen River) and contribute towards achieving WFD objectives.

Groundwater

- 11.4.30. Pollutants coming into contact with bedrock also have the potential to indirectly alter the pH of the groundwater resource. pH and chemical alterations to bedrock are difficult to rectify due to the fractured nature of the rock and the lengthy attenuation and dispersal of chemicals and is considered to be of high sensitivity.
- 11.4.31. The PV Arrays will be piled into the ground at a superficial level (anticipated to be typically driven into the ground up to a depth of 2 m) and will have limited potential to release pollutants into groundwater. The Onsite Substation is the only infrastructure during the construction phase which has any potential to impact groundwater resource due to the nature of other infrastructure which makes up the Proposed Development.
- 11.4.32. Due to the underlying geology at the Onsite Substation consisting of clay-based strata which acts as a barrier to infiltration (and subsequently the transfer of pollutants) with groundwater at depths greater than 2.6 m, groundwater is unlikely to be present near the surface, meaning there is limited potential for pollutants to come into contact with groundwater. Measures such as spill pads, impermeable geotextile membranes and measures described within the **oWMP** will effectively limit the uncontained release of chemicals to minor fugitive releases.

- 11.4.33. Therefore, impact of pollutants from the Proposed Development on groundwater (and as such, receptors which rely on groundwater such as abstraction and SPZs) (**High Sensitivity**) is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is **Not Significant**.

Surface Hydrology

- 11.4.34. Erosion and sedimentation can occur from excavations, de-watering, ground disturbance and overburden stockpiling, the largest element of which would be within the construction of the Onsite Substation. Sediment entering watercourses and drainage ditches has the potential to affect water quality, ecology and flood storage capacity.
- 11.4.35. As a result of the embedded design of the Proposed Development, such as the decision to seed the Solar PV Site with a grass mix (as set out within the **oLEMP**), the overland distance between construction areas and drainage ditches and the flat topography within the localised fields which make up the Order limits, overland flow generation is likely to be minimal and any silt generated during construction will be entrained within cut off ditches before reaching watercourses and land drains.
- 11.4.36. Measures such as silt trap and buffer strips will minimise sedimentation and erosion; further details of these measures are outlined in the **oWMP**.
- 11.4.37. Other construction drainage measures, such as the use of settlement lagoons, swales and interception bunds, will prevent sediment entering watercourses via drainage ditches adjacent to access tracks.
- 11.4.38. Where new crossings and upgrades to existing crossings are required then works will be isolated from the water environment by coffer dams and over pumping. This will limit the potential for sediment and siltation to be transferred into the watercourses.

- 11.4.39. Therefore, impact on watercourses and drainage ditches of **High Sensitivity** is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is **Not Significant**.

Sub Surface Hydrology

- 11.4.40. Sediment has the potential to change near-surface water flow in superficial geology deposits by creating a physical barrier within naturally occurring drainage micropores. Sediment entering near-surface water in superficial deposits also has the potential to impact on groundwater quality within bedrock deposits.
- 11.4.41. The promotion of managed vegetation growth will assist in promoting restraining the soil (at the surface) and increasing the strength of the soil mass (at depth) and reducing the potential for sediment to enter sub-surface hydrology compared to the baseline scenario of tilled agricultural fields.
- 11.4.42. Additionally, measures described in the oWMP, such as impermeable ground membrane layers and bunded areas, will effectively prevent sediment entering sub-surface water in superficial deposits.
- 11.4.43. For these reasons, the magnitude of this effect will be negligible. Given the high sensitivity of near-surface water and groundwater and negligible magnitude of impact, the significance of the effect associated with erosion and sedimentation is considered to be negligible. This is **Not Significant**.
- 11.4.44. Therefore, impact of potential erosion and sedimentation on watercourses and sub surface hydrology of **High Sensitivity** are considered to be of **Negligible Magnitude** and therefore have a **Negligible** significance of effect. This is **Not Significant**.

Impediments to Flow

- 11.4.45. The use of the existing access routes which serve the agricultural operations has minimised the requirement to install new watercourse crossings, therefore minimising the potential for impediment to flow.
- 11.4.46. The minimisation of the number of proposed watercourse crossings and the re-use of the existing watercourse crossings reduces one of the main activities that could give rise to impediment of flows. Additionally, measures described in the **oWMP**, such as the use of a wide box culverts, where appropriate, are likely to prevent impediments to flow being created. Detailed design will be carried out prior to the construction phase, as secured through the DCO Requirements and will be agreed with Lead Local Flood Authority.
- 11.4.47. Therefore, impact on watercourses and drainage ditches of **High Sensitivity** are considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

Changes in Soil Interflow Patterns

- 11.4.48. Some excavations, such as those for the Onsite Substation, may need temporary sub-surface water controls, such as physical cut-offs or de-watering. These temporarily divert flows away from the excavation, and temporarily lower the local water table and sub-surface water levels in the superficial geology. Localised temporary changes to soil interflow patterns may therefore arise.
- 11.4.49. Foundations also have the potential to change sub-surface water flow by creating physical barriers within naturally occurring drainage macropores in soil.

- 11.4.50. No substantial impediments to near-surface water flow will be created as the detailed site drainage design will take into account any severance of saturated areas to ensure hydrological connectivity is maintained.
- 11.4.51. The Solar PV Site will involve the installation of arrays of photovoltaic cells arranged on Mounting Structures driven into the ground up to 2.5m.
- 11.4.52. Given the absence of groundwater at 2.6m below ground level (observed from trial pits and borehole records), it is considered that installing racking system posts to a typical depth of 2 m will have a negligible effect on the displacement or change in sub-surface water flow underlying the Proposed Development due to the thin nature of the supporting frame.
- 11.4.53. Observations from the site walkover indicate the presence of a subsurface drainage network which serves the agricultural fields within the Order limits. The installation of the Mounting Structures has the potential to damage this network by piercing the pipework and impairing its functionality through blockage. In the absence of good construction practice, such as a watching brief and pipe reinstatement, the artificial drainage network is likely to still be able to function, as water would gravitate around racking system and drain to the existing outfalls.
- 11.4.54. Therefore, the impact on soils of **High Sensitivity** is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**

Compaction of Soils

- 11.4.55. The movement of construction traffic, in the absence of construction good practice, can lead to compaction of the soil. This can reduce soil permeability, potentially leading to increased run-off rates and increased erosion. The superficial geology underlying the Proposed Development is generally of low permeability and is in agricultural use, so the effects of

compaction would not result in a substantial increase in runoff from existing conditions.

- 11.4.56. In order to maintain the current level, it is necessary to ensure that construction methods do not seriously disrupt the established drainage network and that no areas are surcharged, either by water discharge or spoil.
- 11.4.57. Maintenance of existing drainage infrastructure is critical to avoid compaction of soils, therefore all existing drainage network channels will be maintained through measures such as plastic spanning under the access tracks to ensure conveyance of flows.
- 11.4.58. Existing traffic routes have been used in the design where practicable, further reducing the potential for soil compaction.
- 11.4.59. Depending on weather conditions during construction, temporary roadways (e.g., plastic or metal matting) may be utilised to access parts of the Order limits during construction to avoid excessive soil disturbance or compaction.
- 11.4.60. Therefore, impact of compaction on soils of **High Sensitivity** is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

Bedrock Excavation

- 11.4.61. The foundations for the Onsite Substation will not require excavations depths that would interact with bedrock i.e. less than 2m below ground level.
- 11.4.62. The PV Arrays and fencing will not be driven to depths that will interact with bedrock.

- 11.4.63. Therefore, impact of excavation on bedrock of **High Sensitivity** is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

Migration of Pollutants from Contaminated Land

- 11.4.64. Desk-top studies have identified minor areas of potentially contaminated land within the Order limits associated with the transport infrastructure (the East Coast Mainline Railway).

- 11.4.65. If potentially contaminated ground be encountered, soils from excavations in proximity to the locations identified will be tested in a laboratory, as set out in the oCEMP, and appropriate action taken (if required) in accordance with The Environmental Protection Act 1990, should elevated concentrations of contaminants be recorded.

- 11.4.66. Given the isolated areas of potential contamination, the method of construction involving minimal ground excavations within the Order limits further reduce the potential for groundwater to be exposed to any contaminants. It is therefore considered that no unacceptable risk is posed to the water environment. The impacts associated with the migration of pollutants from contaminated land are, therefore, considered to be of **Negligible Magnitude** for receptors of **High Sensitivity** (watercourses, drainage ditches, coastal waters and groundwater) and to have a Negligible significance of effect. This is considered **Not Significant**.

Increase in Surface Water Runoff and Flood Risk

- 11.4.67. The Order limits is primarily located within Flood Zone 1, an area classed as having a low probability of flooding. The eastern and southern extents of the Solar PV Site are located adjacent to the West Glen River, an area within Flood Zone 2 (see **Figure 11.4**), and which is described by the EA as having a 'medium probability' of river and surface water flooding in the

National Planning Practice Guidance (NPPG) 'Flood Risk and Coastal Change'.

- 11.4.68. The infrastructure within the Order limits is proposed to be located entirely outside of the modelled 1:100-year (with an allowance for climate change) fluvial flood extents.
- 11.4.69. Appendix 11.5 assesses fluvial flooding associated with the West Glen River using modelled in channel levels provided by the Environment Agency. The **FRA** outlines that the Proposed Development will not be impacted in up to and including the 1:100-year (plus climate change allowance) fluvial event.
- 11.4.70. The FRA concludes that the risk of the Proposed Development flooding from all sources is negligible and non-significant.
- 11.4.71. Access to the Proposed Development during construction will be designed to use existing tracks where possible (secured through the **Design Guidance** set out within the **DAS**) to reduce the requirement for new access tracks.
- 11.4.72. The FRA identifies that the installation of PV Arrays do not have the potential to significantly increase surface water runoff rates compared to the baseline scenario as vegetation under the drip lines establishes and acts to slow the transfer of run-off.
- 11.4.73. The PV Arrays have the potential to concentrate rainfall under the drip lines (regular gaps between PV Modules). Once the rainfall has fallen off a PV Table, the water will be able to spread and flow along the ground under the PV Arrays. Given the topography of the Order limits is generally flat lying it is likely that rain falling on each row of solar panels would flow evenly into the rain-shadow of the row below, so as to mobilise the same percentage of the ground for infiltration as was available before the PV

Arrays were installed. As a result, there is unlikely to be an increase in run-off as a result of the PV Arrays.

- 11.4.74. The area under the PV Arrays will be seeded with a suitable grass/flower mix (as secured within the **oLEMP**) to prevent rilling (incisions in soil caused by concentrated water flow) and an increase in surface water runoff rates. With the implementation of suitable planting, the ground cover is unlikely to generate surface water run-off rates beyond the baseline scenario.
- 11.4.75. Land under the PV Arrays would be allowed to naturally vegetate and possibly be grazed by livestock. As vegetation becomes established under the PV Arrays there is likely to be a decrease in surface water runoff rates and a reduction in the potential for sediment and agricultural chemicals (e.g., phosphates and nitrates) to transfer into the wider hydrological catchment compared to the baseline scenario.
- 11.4.76. Areas of hardstanding (i.e., the Onsite Substation) will be served by a drainage system which incorporates Sustainable Drainage Systems (SuDS) mechanisms to prevent an increase in surface water runoff. These measures are outlined in the Outline Surface Water Drainage Strategy (**Appendix 11.6**) secured as part of the DCO and are to be implemented to prevent an increase in surface water runoff associated with the Solar PV Site.
- 11.4.77. Therefore, the impact of surface water runoff and floods on the receiving watercourses of **High Sensitivity** are considered to be of **Negligible Magnitude** and to have a **Negligible** significance of effect. This is considered **Not Significant**.

Effects on Public Water Supplies (PuWS)

- 11.4.78. There are Source Protection Zones (SPZs) located within the Order limits, with noted abstraction points to the north and south. As set out in the

baseline section of this chapter, the EA and Anglian Water have been contacted about them.

11.4.79. Anglian Water have confirmed there is a PuWS located approximately 2km north-east of the Order limits. The nearest point of the Proposed Development to the supply comprises the Mitigation and Enhancement Areas. The nearest element of infrastructure is the Solar PV Site which is approximately 2.4km south-west of the extraction point.

11.4.80. The EA have confirmed there are four public water supply points summarised in **Table 11-8**.

Table 11-8: Designated Public Water Supplies Sourced from the Environment Agency

Location	Use Description	Source Type	Distance and Direction from the Order limits
River Gwash off Belmesthorpe Lane	Transfer between sources	Surface water for environmental improvements	1km south west
Trout Farm off River Gwash, off Belmesthorpe Lane	Fish farm/cress pond through flow	Surface water for agriculture	1km south west
River Glen east of East Coast Mainline Railway to River Glen off Bourne Road	Direct Spray Irrigation Split Across Two Points	Surface water for agriculture	150m east and immediately west on Bourne Road
River Glen at Broadholme Farm to River Glen near North Farm Lodge pond	Direct Spray Irrigation Split Across Two Points	Surface water for agriculture	Within Order limits and 170m east

11.4.81. The PV Arrays will be fixed to Mounting Structures with a maximum depth of 2.5m into the ground, other infrastructure, such as the substation, within

the Proposed Development will have foundations to approximately 1 m below ground level.

- 11.4.82. Existing trial pits and localised geology data indicates groundwater is not present at depths of up to 2.6m below ground level.
- 11.4.83. The foundations within the Proposed Development will be spread across the Solar PV Site. The shallow nature of foundations and PV Array footings means that the depth of groundwater will be significantly below the proposed footings. Therefore, the Proposed Development will have a negligible impact on groundwater flows associated with any public water supply abstraction points.
- 11.4.84. Horizontal Directional Drilling (HDD) will be utilised to direct cabling beneath the West Glen as part of the Proposed Development. This will involve temporary launch and test pits to facilitate drilling with drilling depths determined following further geotechnical assessment but will achieve a minimum 1.5m headroom between the watercourse bed level and cabling. The implementation of industry standard and best practice construction techniques through the **oCEMP** and **oWMP** will manage any potential groundwater rising within pits (e.g., pumping, sheet piling). Upon completion, pits will be backfilled to prevent any impacts on groundwater following the construction phase.
- 11.4.85. Therefore, the impact of construction on the public water supplies of **High Sensitivity** is considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

Effects on Private Water Supplies

- 11.4.86. The excavations associated with the Proposed Development will be at minimal depths relative to the identified groundwater levels, i.e. groundwater was not recorded at depths of up to 2.6 m below ground level.

The implementation of measures outlined in the **oWMP** will further limit the potential of impacts upon the groundwater environment.

- 11.4.87. Therefore, impact of excavations on the private water supplies receptors of **High Sensitivity** are considered to be of **Negligible Magnitude** and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

Operation

- 11.4.88. Potential effects associated with the operation of the Proposed Development are:
- a. Increased or decreased surface water run-off rates;
 - b. Continued or decreased erosion and sedimentation from runoff from areas of hardstanding and the PV Arrays;
 - c. Alterations to natural flow pathways from runoff from areas of hardstanding;
 - d. Reduced chemical loading of watercourses associated with the cessation of nitrate application; and
 - e. A risk of a pollution event from minor spills caused by maintenance vehicles.
- 11.4.89. The nature of these effects has been discussed in relation to the construction phase. However, as there should be substantially less activity and ground disturbance within the Order limits during the operation phase, it is expected that the magnitude of impact of many of these effects will be less than in the construction phase. This is with the exception of rainfall run-off from the PV Arrays, which is expected to remain the same as during the construction phase, as the arrays will be in place early during the construction phase.

- 11.4.90. Land under the PV Arrays would be allowed to vegetate following seeding with a wildflower or grass mix and potentially will be grazed by livestock. As vegetation becomes established under the PV Arrays there is likely to be a decrease in surface water runoff rates and a reduction in the potential for sediment and agricultural pesticides (phosphates and nitrates) to transfer into the wider hydrological catchment compared to the baseline scenario, where agricultural fields remain tilled for substantial parts of the year.
- 11.4.91. Whilst alterations to natural flow pathways will not be introduced during the operational phase, any changes during construction will continue through operation, as the majority of infrastructure will remain in place. Alterations to natural flow pathways will be reduced through adopting good practice design and construction, as set out in the oCEMP and secured in the DCO, such as cross drainage, use of shallow drainage ditches and prevention of blockages.
- 11.4.92. As a result, the magnitude and significance of all effects associated with operation of the Proposed Development are assessed as being negligible, and not significant.

Decommissioning

- 11.4.93. Potential effects of decommissioning the Proposed Development are similar in nature to those during construction, as some ground-work would be required to remove foundations and hardstanding to approximately 1m below ground level. These effects would be substantially lesser in magnitude than during construction, and would be controlled by a DEMP. Where infrastructure would be left in place e.g. foundations for onsite buildings or access tracks, drainage features would also remain where this is compatible with the **oCEMP**. As such, the impact of decommissioning activities receptors of **High Sensitivity** are considered to be of **Negligible**

Magnitude and therefore to have a **Negligible** significance of effect. This is considered **Not Significant**.

11.5. Proposed Additional Mitigation

11.5.1. No additional mitigation is required.

11.6. Residual Effects

11.6.1. With the embedded mitigation in place, all identified potential effects have been assessed as having a negligible significance of effect, and therefore not significant. As a result, there are no residual effects to consider.

11.7. Monitoring Requirements

11.7.1. There are no identified significant residual effects and therefore no monitoring is required.

11.8. Cumulative Effects

11.8.1. A cumulative effect is considered to be an additional effect on hydrological receptors (within the same hydrological catchment) arising from the Proposed Development in addition to the combination of other developments likely to affect the hydrological environment including receptors which rely on the resource, such as PWS and designations.

11.8.2. At distances greater than 5km, it is considered that cumulative developments are unlikely to contribute to a cumulative hydrological effect due to attenuation and dilution over distance of potentially polluting chemicals. Therefore, for the purposes of the assessment of potential cumulative effects on the immediate catchment and hydrological regime, only cumulative developments, which require large scale construction / excavation, within approximately 5km of the Order limits have been considered.

11.8.3. **Table 11-9** details the submitted applications within the 5km cumulative study area.

Table 11-9: Cumulative Developments

ID	Planning Authority	Address	Planning References	Status	Distance from Order limits	Summary
1	Rutland CC	Woolfox Golf And Country Club Hardwick Farm Lane Empingham Rutland PE9 4NJ	2020/1480/MAF	Approved	3.4km west	No surface watercourses linking the site with the Development.
2	Rutland CC	New warehouse. Land Adjacent To Buildings 25 And 26 Meadow Park Industrial Estate Essendine Rutland	2021/0379/MAF	Approved	150m east	New warehouse connecting to the existing surface water sewer. Unlikely to be hydrologically connected to the Proposed Development due to surface water being disposed of via utilities infrastructure, therefore scoped out of the assessment.
3	Rutland CC	4 Dwellings. Casterton Lane Yard, Holme Close, Tinwell	2019/0469/FUL	Approved and under construction	4.9km	Construction phases unlikely to overlap and therefore scoped out of the assessment. Unlikely to give rise to effects during operation.
4	Rutland CC	River Gwash Trout Farm Belmesthorpe Lane Ryhall Rutland PE9 4JZ	2021/1268/FUL	Awaiting decision	700m south-west	11 dwellings.
5	SKDC	Moorelake House Barholm Road Tallington Lincolnshire PE9 4RJ	S18/0567	Approved	3km south-east	Use of land for the siting of 20 touring caravans

ID	Planning Authority	Address	Planning References	Status	Distance from Order limits	Summary
6	SKDC	Stamford Junior School Kettering Road Stamford PE9 2LR	S20/2201 & S21/2146	Approved	3km south-west	Demolition of existing pavilion, erection of new sports centre, change of use of agricultural land to sports pitch, installation of 2 replacement sports pitches and floodlights, and alteration to access
7	SKDC	Land To The North Of Uffington Road, Stamford PE9 1TX	S21/0938	Approved	1.3km south-west	Erection of 200 dwellings with associated infrastructure and landscaping
8	SKDC	Stamford Rugby Club Hambleton Road Stamford PE9 2RZ	S21/1764	Approved	3.6km south-west	Demolition of existing buildings and construction of proposed clubhouse building, changing rooms and associated facilities.
9	SKDC	Ross Thain & Co Ltd Belton Street Stamford PE9 2EF	s21/0683	Awaiting decision	2.2km south-west	Redevelopment of site for mixed use development comprising Class C3(a) Residential and Class E(c)(ii) Office uses
10	SKDC	Land Off Uffington Road Stamford	s20/0955 & S21/0329	Approved	1km south-west	Erection of a food retail store (Class A1) with associated access, car parking, servicing and landscaping.
11	SKDC	Land North Of Barnack Road Stamford	S20/2056	Approved	1.3km south-west	Demolition of existing factory premises (excluding original factory building at south western edge of site). Erection of a high quality mixed use development comprising;

ID	Planning Authority	Address	Planning References	Status	Distance from Order limits	Summary
						Class E development of offices and workshops (10,000m ² (GIA)), local foodstore and café;
12	SKDC	Stamford And Rutland Hospital Ryhall Road Stamford PE9 1UA	S20/0118	Approved	1.6km south-west	New multi deck car park, to replace existing ground level car park.
13	SKDC	Land Off Cherryholt Road Cherryholt Road Stamford PE9 2EP	S19/1475	Awaiting appeal decision	1.9km south-west	Erection of 31 affordable dwellings and associated works including access and landscaping.
14	SKDC	Cummins Generator Technologies Stamford Business Park Ryhall Road Stamford PE9 1XT	S19/0011 & S17/2220	Approved	1.4km south-west	New Warehouse and Office Facility including Car Parking and Service Yard.
15	SKDC	Land Off East Street Stamford	S17/0829	Approved	2km south-west	Demolition of garages and storage buildings and construction of 32-bed boarding house for Stamford Endowed Schools.
16	SKDC	Land Off Uffington Road Stamford	S17/0613	Approved	1.3km south-west	Outline application for residential development of up to 100 dwellings with all matters reserved except for access.

ID	Planning Authority	Address	Planning References	Status	Distance from Order limits	Summary
17	SKDC	Former Hindmarch Garage Uffington Road Stamford PE9 2EX	S17/0519	Approved	1km south-west	Residential development including demolition of existing buildings, erection of 11 dwellings with garage and associated works
18	SKDC	The Old Quarry Station Road Castle Bytham	S19/2160	Awaiting decision	5km north-west	Outline planning application in respect of up to 81 dwellings across Plots A and B with all matters reserved except for accesses off Station Road.
19	SKDC	The Old Quarry Station Road Castle Bytham	s19/2142 & S17/1134	Approved	5km north-west	Reserved matters sought for appearance, landscaping and scale for 18 dwellings in plot A pursuant to S17/1134
20	SKDC	Land North-west Of Wood Lane, Thurlby, Bourne	s22/0033	Screening Opinion - non-EIA development	5km north-east	Request for an EIA Screening Opinion for a Solar Farm with a Battery Energy Storage Scheme
21	SKDC	Old Langtoft Gravel Pit Land To South Of Stowe Road, Langtoft	S22/0073	Awaiting decision	3.8km south-east	Erection of 35 dwellings (Outline permission S17/1900)
22	PCC	Land To The West Of Uffington Road Barnack Stamford	18/00377/REM & 20/00659/NONMAT	Approved, under construction	3.3km south-east	Reserved matters approval relating to appearance, landscaping, layout and scale for 80 dwellings with associated landscaping, public open space, surface

ID	Planning Authority	Address	Planning References	Status	Distance from Order limits	Summary
						<p>water drainage and access pursuant to outline planning permission.</p> <p>Construction phases unlikely to overlap and therefore scoped out of the assessment. Unlikely to give rise to effects during operation.</p>

- 11.8.4. The greatest potential for cumulative effects arises when the construction phase of another development overlaps with the construction phase of the Proposed Development. Cumulative effects are considered to have the potential to be significant only where such an overlap may exist, as activities such as excavation works, concrete pouring in the construction phase that could be potentially detrimental to the hydrological environment are greatly reduced during the operational phase of developments.
- 11.8.5. Assuming commencement of the construction of the Proposed Development in 2026, lasting for approximately 24 months, this will not coincide with the construction phase of the following cumulative development (which is already operational) and therefore there is unlikely to be potential for cumulative effects as a result of the following cumulative development:
- 3 – No. 4 Dwellings. Casterton Lane Yard, Holme Close, Tinwell; and
 - 22 – Land To The West Of Uffington Road Barnack Stamford.
- 11.8.6. The following cumulative development does not involve large scale construction:
- 5 - Moorelake House Barholm Road Tallington Lincolnshire – 20 touring caravans.
- 11.8.7. Inspection of OS mapping and aerial photography indicates that the following cumulative developments appear to have no surface watercourses within 200 m or are in a separate catchment to the Proposed Development i.e. outside the catchment of the West Glen River and have therefore been discounted due to the lack of a surface water hydrological linkage:
- 1 - Woolfox Golf And Country Club Hardwick Farm Lane;

- 2 - New warehouse. Land Adjacent To Buildings 25 And 26 Meadow Park Industrial – no watercourses within 200 m and drained by surface water sewer;
- 4 - River Gwash Trout Farm – located on the River Gwash;
- 6 - Stamford Junior School – Located in catchment of River Welland;
- 7 - Land To The North Of Uffington Road - Located in catchment of River Welland;
- 8 - Stamford Rugby Club – no watercourses within 200 m;
- 9 - Ross Thain & Co Ltd - Located in catchment of River Welland;
- 10 - Land Off Uffington Road - located on the River Gwash;
- 11 - Land North Of Barnack Road - Located in catchment of River Welland;
- 12 - Stamford And Rutland Hospital - no watercourses within 200 m - Located in catchment of River Welland;
- 13 - Land Off Cherryholt Road - Located in catchment of River Welland;
- 14 - Cummins Generator Technologies - no watercourses within 200 m - Located in catchment of River Gwash;
- 15 - Land Off East Street Stamford - Located in catchment of River Welland;
- 16 - Land Off Uffington Road - Located in catchment of River Welland;
- 17 - Former Hindmarch Garage Uffington Road - Located in catchment of River Welland;
- 21 - Old Langtoft Gravel Pit – no hydrological connection to River Welland;

- 22 - Land To The West Of Uffington Road Barnack - no watercourses within 200 m.

11.8.8. As such, the above cumulative developments have been discounted from this assessment.

Construction Phase Cumulative Effects

11.8.9. The following cumulative developments involve large scale construction, are located within the catchment of the West Glen River:

- 18 & 19 - The Old Quarry Station Road Castle Bytham; and
- 20 - Land North-west Of Wood Lane, Thurlby, Bourne.

11.8.10. Due to the large-scale nature the proposed cumulative applications they are likely involve substantial earthworks during the construction phase, and the primary cumulative effects are likely to be sedimentation, pollution effects and an increase in flow rates associated with increased run-off from new hardstanding areas on surface water resources. Due to the absence of groundwater at depths which could interact with the Proposed Development and the embedded good practice outlined in the **oWMP**, effects on groundwater have been scoped out of the assessment. Similarly, given the absence of predicted effects from contaminated land within the Order limits associated with the Proposed Development, any effects on contaminated land would be in isolation from other developments and has been scoped out.

11.8.11. Whilst there is a possibility of sediment and pollutants migrating offsite from the proposed cumulative developments, the EA and other relevant consultees have stipulated several construction control measures and permit requirements as part of the planning approval and application process for cumulative developments IDs 18 and 19, which should

therefore limit the potential for effects through the use of construction good practice.

- 11.8.12. Cumulative development ID 20 is a proposed solar and BESS site and is likely to be subject to an Environmental Permit from the Environment Agency, the terms of which can be relied on to reduce risk of pollution to a nominal level.
- 11.8.13. These construction measures will limit the potential for contaminants and sediment to be transferred to surface watercourses and groundwater.
- 11.8.14. All sites also include a SuDS strategy, as they are classed as major developments, to restrict surface water run-off rates and assist in the removal of sediment and pollutants from the site.
- 11.8.15. Measures presented within the **oWMP** will limit the potential for sediment and pollutants to be transferred from the Proposed Development, meaning there is limited potential for the Proposed Development to contribute to a cumulative effect on water quality.
- 11.8.16. The increase in flow rates is considered to be of negligible magnitude for the Proposed Development.
- 11.8.17. Therefore, cumulative effects during the construction phase on all receptors (**High Sensitivity**) are considered to be of **Negligible Magnitude** and therefore of **Negligible** significance. This is considered **Not Significant**.

Operational Phase Cumulative Effects

- 11.8.18. It is anticipated that there will be a minor reduction in flow rates during the operational phase of the Proposed Development due to the implementation of SuDS and through managed grassland, when compared to the construction phase.

11.8.19. Therefore, cumulative effects during the operational phase on all receptors (**High Sensitivity**) are considered to be of **Negligible Magnitude** and therefore of **Negligible** significance. This is considered **Not Significant**

11.9. Conclusion

11.9.1. This chapter has assessed the likely significant effects of the Proposed Development on hydrology, hydrogeology flood risk and ground conditions. The Proposed Development has been assessed as having negligible significant effect on these receptors.

11.9.2. Given that only effects of moderate significance or greater are considered significant, the potential effects on hydrology, hydrogeology, flood risk and ground conditions are considered to be not significant.

11.9.3. **Table 11-10** summarises the predicted effects of the Proposed Development on the hydrology and hydrogeology resources.

Table 11-10: Summary of Effects

Description of Effect/ Activity	Nature of Effect	Receptor	Value of Receptor	Embedded Mitigation Measures	Magnitude of Impact	Potential Significance of Effect	Additional Mitigation Measures	Residual Effect Significance	Monitoring Requirement
Construction Phase									
Chemical Pollution	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Erosion and Sedimentation	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Impediments to Flow	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None

Description of Effect/ Activity	Nature of Effect	Receptor	Value of Receptor	Embedded Mitigation Measures	Magnitude of Impact	Potential Significance of Effect	Additional Mitigation Measures	Residual Effect Significance	Monitoring Requirement
Changes in Soil Interflow Patterns	Adverse, Long-term	Soils and near-surface water	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Compaction of Soil	Adverse, Long-term	Soils	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Migration of Pollutants from Contaminated Land	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Increase in Run-off	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (oWMP) SuDS (Outline Surface Water Drainage Strategy)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None

Description of Effect/ Activity	Nature of Effect	Receptor	Value of Receptor	Embedded Mitigation Measures	Magnitude of Impact	Potential Significance of Effect	Additional Mitigation Measures	Residual Effect Significance	Monitoring Requirement
Changes in quality or quantity of supply	Adverse, Long-term	PWS and PuWS	High	Good practice measures (oWMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Operational Phase									
Increased Run-off Rates / Volume	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	SuDS (Outline Surface Water Drainage Strategy)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Erosion and Sedimentation	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Maintenance program for watercourses set out in the oWMP.	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Alterations to natural flow pathways	Adverse, Long-term	Soils and near-surface water	High	Depths of infrastructure limited to less than 2 m	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None

Description of Effect/ Activity	Nature of Effect	Receptor	Value of Receptor	Embedded Mitigation Measures	Magnitude of Impact	Potential Significance of Effect	Additional Mitigation Measures	Residual Effect Significance	Monitoring Requirement
				below ground level					
Risk of a Pollution Event from Minor Spills from Maintenance Vehicles	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Spill event procedures and best practice measures to be implemented as set out in the oWMP.	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Decommissioning Phase									
Chemical Pollution	Adverse, Long-term	Watercourses, drainage ditches and near-surface water	High	Good practice measures (Decommissioning EMP)	Negligible (non-significant)	None	Negligible (non-significant)	None	Negligible (non-significant)
Erosion and Sedimentation	Adverse, Long-term	Watercourses, drainage ditches and	High	Good practice measures	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None

Description of Effect/ Activity	Nature of Effect	Receptor	Value of Receptor	Embedded Mitigation Measures	Magnitude of Impact	Potential Significance of Effect	Additional Mitigation Measures	Residual Effect Significance	Monitoring Requirement
		near-surface water		(Decommissioning EMP)					
Changes in quality or quantity of supply	Adverse, Long-term	PWS and PuWS	High	Good practice measures (Decommissioning EMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None
Compaction of Soil	Adverse, Long-term	Soils	High	Good practice measures (Decommissioning EMP)	Negligible	Negligible (non-significant)	None	Negligible (non-significant)	None

11.10. References

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Ref 11-37 NetRegs (2022) Guidance for Pollution Prevention (GPPs).

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