Fosse Green Energy

Preliminary Environmental Information Report

VOLUME

3

Appendix 9-B: Water Framework Directive Screening Assessment

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1. Introduction

1.1 Background

1.1.1 This Water Framework Directive (WFD) Screening Assessment has been produced as part of the Preliminary Environmental Information (PEI) Report for Fosse Green Energy (hereafter, 'the Proposed Development'). This appendix relates to **PEI Report Volume 1, Chapter 9: Water Environment**.

1.1.2 The Proposed Development comprises the construction, operation and maintenance, and decommissioning of a solar photovoltaic (PV) electricity generating facility, associated electrical equipment, cabling and on-site Battery Energy Storage System (BESS) across a proposed site which lies to the south and south west of Lincoln (hereafter referred to as the 'Principal Site'), together with grid connection infrastructure to be located within the 'Cable Corridor'.

1.1.3 The Proposed Development comprises the following key pieces of infrastructure:

a. Solar PV panels (also known as 'modules');
b. PV panel mounting structures;
c. Battery Energy Storage System (BESS);
d. Inverters;
e. Transformers;
f. Switchgear;
g. An Onsite Substation and control buildings;
h. Onsite cabling;
i. Ancillary infrastructure (e.g. combiner boxes, weather stations);
j. Electricity export and import via high-voltage Grid Connection Cable and connection to the National Electricity Transmission System;
k. Fencing and security;
l. Access Tracks; and
m. Landscaping and biodiversity enhancement areas.

1.1.4 More detailed information regarding these elements is described **in PEI Report Volume 1, Chapter 3: The Proposed Development** and are also described later in this report where relevant (**Table 1**).

1.1.5 The Proposed Development interacts with 11 WFD water bodies (eight surface water bodies and three groundwater bodies) and thus it is necessary to consider the activities and constituent parts of the Proposed Development to determine compliance with WFD objectives. This includes assessing the impact of new solar PV panels, supporting infrastructure, site drainage and cable crossings of water bodies on the biological, physico-chemical and hydromorphological quality elements that comprise the WFD to ensure no deterioration and no prevention of future improvement in water body status. Both surface and groundwater bodies are considered.

1.1.6 In accordance with the Planning Inspectorate's Advice (Ref 4), a three-stage approach to WFD assessment will be adopted, comprising screening, scoping and impact assessment. Each stage is described in Section 2 of this Report.

1.1.7 This Report therefore presents the findings of an initial WFD screening exercise (the first stage in the WFD assessment process) which has been undertaken in relation to the Proposed Development.

1.1.8 WFD scoping and full assessment of WFD compliance will be undertaken in support of the Environmental Statement (ES) that will form part of the Development Consent Order (DCO) Application once further details of the Proposed Development have been finalised.

1.1.9 This Report should be read in conjunction with **PEI Report Volume 1, Chapter 9: Water Environment** which is supported by **PEI Report Volume 2, Figure 9-1: Surface Water Features and their Attributes** and **Figure 9-2: Groundwater Features and their Attributes**.

1.2 Study Area

1.2.1 The Proposed Development is located within the Anglian River Basin District, with a small area around Morton Hall falling under the Humber River Basin District. The Proposed Development is located approximately 9km south and south west of Lincoln in a predominantly agricultural landscape surrounded by the villages of Witham St Hughs, Bassingham, Thurlby and Thorpe on the Hill, amongst others. **PEI Report Volume 1, Chapter 2: The Site and Surroundings** presents further details on the area of the Proposed Development.

1.2.2 For the purposes of this assessment, and consistent with **PEI Report Volume 1, Chapter 9: Water Environment**, a general study area (Zone of Influence (ZOI)) of approximately 1km from the Site Boundary has been considered in order to identify water bodies that are hydrologically connected to the Proposed Development, and potential works associated with the Proposed Development, that could cause direct impacts. However, given that impacts may propagate downstream, where relevant the assessment also considers a wider study area to account for any impacts that may be transmitted downstream that may influence WFD quality element receptors (which in this case is typically for a few kilometres). Professional judgement has been applied to identify the extent to which such features are considered.

1.2.3 In this case, watercourses across the Study Area drain towards the River Witham, and so this is considered the final receiving water body that could conceivably be affected (and which is within 1km of the Site boundary). As such, a 1km buffer around the Site Boundary is considered appropriate for the Study Area.

1.2.4 The Study Area falls within the following management catchments and surface water body catchments:

a. Witham Upper / Witham from Cringle Brook to Brant Lower Water Body (GB105030056780);
b. Witham Upper / Brant Lower Water Body (GB105030056770);
c. Witham Upper / South Hykeham Catchwater Water Body (GB105030062460);
d. Witham Lower / Dunston Beck Water Body (GB105030056230);
e. Witham Lower / Metheringham Beck Water Body (GB105030056210);
f. Trent and Trib / Fleet Lower Catchment (trib of Trent) (GB104028058250);
g. Witham Upper / Boultham Catchwater Drain Water Body (GB105030062380).

1.2.5 There are also a number of smaller water features within the Study Area, which do not have WFD classifications in their own right, but which would all ultimately drain to the River Witham or The Fleet (and these are covered by their WFD designations).

1.2.6 The Study Area is also underlain by three groundwater WFD water bodies:

a. Witham Lias Water Body (GB40502G401400);
b. Witham Limestone Unit A Water Body (GB40501G444800); and
c. Lower Trent Erewash – Secondary Combined Water Body (GB40402G990300).

1.2.7 Further baseline details and WFD classifications for each of the WFD waterbodies is given in **Section 4** of this report. WFD waterbody locations in relation to the Proposed Development and a depiction of the study area are presented in **PEI Report Volume 2, Figure 9-1** and **Figure 9-2**.

1.3 Introduction to the Water Framework Directive

1.3.1 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 1), commonly referred to as the Water Framework Directive (WFD), aims to protect and enhance the water environment.

1.3.2 The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between the following 'Quality Elements':

a. Ecological status;
b. Biological quality;
c. General chemical and physico-chemical quality;

d. Hydromorphological quality;

e. Specific pollutants with UK Environmental Quality Standards (EQS);

f. Chemical status; and

g. Priority substances and other EU level substances with EU EQS.

1.3.3 Under the WFD, ‘water bodies’ are the basic management units, defined as all or part of a river system or aquifer. Waterbodies form part of a larger ‘river basin district’ (RBD), for which ‘River Basin Management Plans’ (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs are at Cycle 3 and were published in 2022.

1.3.4 In England, the Environment Agency is the competent authority for implementing the WFD, although objectives are delivered in partnership with other public bodies and private organisations, for example local planning authorities, water companies, rivers trusts, and private landowners and developers.

1.3.5 The Environment Agency is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are typically responsible for consenting activities on Ordinary Watercourses. Local planning authorities are typically responsible for highways drains, and landowners are typically responsible for ditches and watercourses within their property including piped watercourses and culverts. While the Environment Agency is ultimately responsible for enforcing the WFD on any water body, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

1.3.6 As part of its regulatory and statutory consultee role on planning applications and environmental permitting (under the Environmental Permitting Regulations (England and Wales) 2016), the Environment Agency and WFD-partnering organisations, must consider whether proposals for new developments have the potential to:

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

b. Prevent future attainment of good status or potential where not already achieved.

1.3.7 Regulation 33 of the Water Environment Regulations 2017 (Ref 1) (i.e. the WFD) states that public bodies “*must, in exercising their functions so far as affecting a river basin district, have regard to - (a) the river basin management plan for that district as approved under regulation 31, and (b) any supplementary plan prepared under regulation 32”.* The Proposed Development must therefore reflect water body improvement priorities as outlined in the Humber RBMP and the Anglian RBMP.

1.3.8 In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, the Environment Agency and partnering organisations must also consider the conservation objectives of any

Protected Areas (e.g. Natura 2000 sites or water dependent Sites of Special Scientific Interest) and adjacent WFD water bodies, where relevant.

2. Methodology

2.1 WFD Methodology

2.1.1 There are no fixed methods for WFD assessment. The nature of the water environment and the breadth of the legislation mean that assessments are tailored to proposals on a case-by-case basis.

2.1.2 The following general guidance is available which has been applied for this assessment:

a. Environment Agency (2016). Water Framework Directive risk assessment. How to assess the risk of your activity (Ref 2);

b. Environment Agency (2016b). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers (Ref 3); and

c. The Planning Inspectorate (2024). Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Ref 2).

2.1.3 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. The general approach is described by The Planning Inspectorate (2024) and briefly summarised below.

2.1.4 This assessment included herein comprises a Screening assessment, which identifies requirements (if any) for WFD impact mitigation commitments in the planning submission, and identifies requirements for further WFD impact assessment at future design stages.

Stage 1: Screening

2.1.5 Screening identifies the zone of influence of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

Stage 2: Scoping

2.1.6 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

Stage 3: Impact Assessment

2.1.7 Stage 3 involves rationalised assessment of water bodies and Quality Elements that could be affected by proposed activities, to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

2.2 Mitigation Commitments

2.2.1 Proposed mitigation activities relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through planning licence conditions, Development Consent Order requirements, or other legally binding methods.

2.3 Further Assessments if WFD Derogation is to be Considered by the Applicant

2.3.1 WFD Regulation 17 and Regulation 19 set out ‘last resort’ planning and legal processes for WFD derogation that are not part of this report. Case review of any proposed justification by an applicant would be a matter for the Secretary of State and is likely to require a substantial body of multi-disciplinary evidence.

2.3.2 Where the potential for deterioration of water bodies is identified, and the *“body of water is so affected by human activity or its natural condition is such that the achievement of the environmental objectives set would be infeasible or disproportionately expensive”*, it is possible for an applicant to present further assessments in the context of WFD Regulation 17. Derogation has not been considered herein and would require detailed further analyses of options, environmental impacts and business cases, for WFD and all relevant legislation pertaining to planning and sustainability. For WFD context, WFD Regulation 17 covers part of the procedures for WFD derogation, including but not limited to that *“the environmental and socio-economic needs served by such human activity cannot be achieved by other means which are a significantly better environmental option not entailing disproportionate costs”*.

2.3.3 Where the potential for *“failure is the result of new modifications to the physical characteristics of the body of surface water or alterations to the level of the body of groundwater”*, it is possible for an applicant to present further assessments in the context of WFD Regulation 19. Regulation 19 is also still commonly referred to as Article 4.7 of the original EU Directive. Derogation has not been considered herein and as above would require detailed further analyses. For WFD context, WFD Regulation 19 covers part of the procedures for WFD derogation, including but not limited to that:

a. "*all practicable steps are taken to mitigate the adverse impact on the status of the body of water*".

b. "*the reasons for the modifications or alterations, or for the sustainable development activities, are of overriding public interest*".

c. "*the benefits to the environment and to society of achieving the environmental objectives are outweighed by the benefits of the new modifications or alterations, or of the sustainable development activities, to human health, to the maintenance of human safety, or (in the case of modifications or alterations) to sustainable development*".

d. "*the beneficial objectives served by the modifications or alterations, or by the sustainable development activities, cannot, for reasons of technical feasibility or disproportionate cost, be achieved by other means which are a significantly better option*".

2.4 Desk Study

2.4.1 A desk-based study was carried out to capture information pertaining to the Proposed Development to support the understanding of baseline conditions. A Review of relevant information relating to the study area was undertaken to develop a baseline overview for WFD catchments, watercourses and surrounding areas. The following data sources were used for the desk study:

a. WFD status and objectives from the appropriate River Basin Management Plan for Cycle 3 data, available from the Catchment Data Explorer (Ref 5);

b. Defra's Multi-agency government information for the countryside website (MAGIC), including contemporary Ordnance Survey (OS) maps (Ref 6);

c. Historical maps (Ref 7);

d. British Geological Survey maps (Ref 8);

e. Soilscapes website (Ref 9);

f. Aerial photography (Ref 10);

g. Hydrological information (Ref 11);

h. Climate information (Ref 12);

i. Environment Agency Fish and Ecology Data Viewer (Ref 13); and

j. Environment Agency Water Quality Archive website (Ref 14).

2.5 Field Survey

2.5.1 An initial site walkover survey was undertaken by a water scientist and hydromorphologist on 3 October 2023 in dry and overcast conditions to assess watercourse connectivity, quality and condition.

2.6 Limitations and Assumptions

2.6.1 This WFD screening assessment has been undertaken based on design information at the time of writing (August 2024), and as described in **PEI Report Volume 1, Chapter 3: The Proposed Development** and further information provided in **PEI Report Volume 1, Chapter 9: Water Environment**.

2.6.2 Where there is uncertainty in the design, reasonable assumptions have been made and these are described at relevant points within this assessment, such as the Screening of Activities. Further assessment or updates may therefore be required if there are material changes to the design elements post planning or it is determined that proposed embedded mitigation cannot be implemented as currently proposed for whatever reason.

2.6.3 A request for WFD information and water quality and flow data was issued to the Environment Agency to inform the desk study in April 2023. A full response had been received in May 2023 and has therefore been taken into account in this assessment. It is considered that sufficient baseline information has been gathered from the desk study to enable this screening assessment to be undertaken.

2.6.4 Temporary works will not be assessed unless they are of a potentially significant scale and have the potential to adversely affect flood risk or impact the quality or form of water bodies. The temporary works where such risks are considered significant (for example, excavations for the cable route), have been identified and assessed where there is sufficient detail to do so at this stage. Operational maintenance activities are generally considered of insufficient scale to require assessment.

2.6.5 At the time of writing, the specific locations and methodologies of construction and installation of the cables within the Principal Site and the Cable Corridor remain subject to further development. However, it has been confirmed at this stage that the River Witham and the River Brant will be crossed using non-intrusive, underground techniques (e.g. horizontal directional drilling (HDD)) that would not disturb the watercourse. The depth of the cable below the bed will be a minimum of 5m so as not to disturb the channel or risk being exposed by future bed scour. The launch and receiving pits will be set back from the bank top of the watercourse to protect riparian habitats. Where the Interconnecting Cable Corridor is proposed to cross the River Witham, this setback will be extended to a minimum of 100m in recognition of the presence of a potential Otter holt. Construction methods including the size and depths of any launch or receiving pits are yet to be confirmed.

2.6.6 Cable crossings of smaller watercourses are currently assumed to require open-cut installation techniques. As such, open-cut crossings are assumed as a worst-case scenario at this stage, with a maximum width of 5m being affected in each case (but will be reviewed at the ES stage). For these crossings it is assumed that water flow would be maintained by damming and over pumping. Several of the ditches within the Site Boundary are ephemeral and if works could be carried out in the drier months this would reduce the risk of pollution propagating downstream, although this cannot be guaranteed and thus no weight has been attributed to this at this stage. It will be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity.

2.6.7 Decisions on final watercourse crossing proposals associated with cables and internal access roads will be determined at the ES stage and the relevant statutory stakeholders consulted. However, indicative locations are shown in **PEI Report Volume 2, Figure 9-1: Surface Water Features and their Attributes**. Where watercourses/ditches are crossed for access (either temporarily during construction or permanently during operation), it is preferred that new crossings will be clear span and wide enough to avoid the loss of in-channel and riparian habitats. Existing crossings will be used where possible, and the number of crossings required will also be reduced wherever possible. Nonetheless, as crossing structures are yet to be confirmed, a worst case has been assumed for the PEI Report that new crossings may be culverted.

2.6.8 Where culverts are required, it will be expected that the least impacting design that is reasonably practicable is proposed (e.g. arch rather than box culverts, and box culverts in preference to pipes etc.). The maximum width would be 6m to allow sufficient width for the access tracks. The crossings will be sized at detailed design in order to not impact on flow conveyance and be sized to ensure capacity for the peak flow rate. The culvert inverts will be buried below the natural bed level to allow for natural bed formation and passage of sediments, typically at least 0.3m. Where arch culverts are not provided, it has been assumed that the design of the structure will allow for a naturalised bed to be formed through the structure. There is varying guidance as to what minimum depth is required, but there are also design considerations. Therefore, this will be considered at detailed design stage. Furthermore, the crossing should be perpendicular to the flow, and connectivity maintained for aquatic species and riparian mammals, with a mammal ledge if there is sufficient room.

2.6.9 The Proposed Development infrastructure will be set back from all water features by at least 10m to create a buffer zone. The point of measurement will be agreed with the Environment Agency, the LLDA or IDB as appropriate through further consultation, but it is expected this would be measured from the water's edge / channel extents under normal flow.

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

2.6.11 The risk from surface water runoff to surface or groundwater features has been provisionally assessed on the basis of **PEI Report Volume 3, Appendix 9-D: Outline Drainage Strategy** and which will be further developed prior to submission within the ES. The delivery of the detailed Drainage Strategy and implementation of the measures it contains will be secured through a Requirement of the DCO.

2.6.12 The pollution risk from this runoff across the Principal Site is minimal as solar PV panels do not contain any liquid (hazardous or not) that could contaminate rainwater. They will be cleaned on two yearly cycles as a worst case. As the use of cleaning products (chemicals) can damage panels and void manufacturer's warranties no cleaning products would be used, only water. It is assumed at this stage that clean water will be delivered to the site for use in specially adapted tractors and this will not lead to any significant pollution risk.

2.6.13 The Battery Energy Storage System (BESS) will have built-in fire detection and be fitted with an automatically operated internal fire extinguisher system. A Framework Battery Safety Management Plan (BSMP) will be presented as part of the DCO application. To inform its production, engagement will take place with the local Fire and Rescue service to understand their approach to tackling BESS fire. It is currently anticipated that fire water supply will be needed on site (rather than the water being taken from nearby hydrants or provided through the onboard storage capacity of attending fire engines) and allowance has been made for fire water storage within the design. The ES will contain details of the water supply, water tank dimensions and storage capacities. Similarly, provision of fire water containment (impermeable water capture to prevent used firewater reaching ground/the surrounding environment) will be required. Further details are given in the **PEI Report Volume 3, Appendix 9-D: Outline Drainage Strategy**.

2.6.14 Land use change relating to ceasing productive arable farmland within the Site to accommodate the Proposed Development will reduce water quality risk to watercourses associated with diffuse agricultural chemicals and possibly reduce soil erosion and need for local abstractions for irrigation, thereby providing a beneficial impact. However, there is limited data on the existing conditions and activities, and therefore no further consideration has been given to this potential benefit at this stage.

2.6.15 There will be welfare facilities associated with the Proposed Development for up to four permanent FTE members of staff, with up to 20 being in attendance for periods of maintenance, cleaning or solar infrastructure replacement. Given the low daily occupancy only small volumes of foul drainage will be generated. This will be managed using a self-contained foul drainage system to a sealed cesspit. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.

2.6.16 In the UK climate, solar PV panels are largely self-cleaning and deterioration in PV system output due to dust or dirt is generally low. The requirement for, and the frequency of, cleaning of the solar PV panels due to the build-up of dust and dirt varies depending upon site- specific conditions. Therefore, as a worst case it is assumed that the solar PV panels will be cleaned on two yearly cycles (although the period between cleaning can be much longer). As the use of cleaning products (chemicals) can damage panels and void manufacturer's warranties, no cleaning products would be added to the water for panel cleaning. Panel cleaning will therefore not lead to any significant pollution risk.

3. Baseline

3.1 Catchment Characteristics

3.1.1 A summary of baseline characteristics in the study area is provided below. For further detail refer to **PEI Report Volume 1, Chapter 9: Water Environment**. Also refer to **PEI Report Volume 2, Figure 9-1: Surface Water Features and their Attributes** and **Figure 9-2: Groundwater Features and their Attributes**.

Topography and Land Use

3.1.2 The topography of the Cable Corridor Study Area generally rises gently west of the River Brant (at less than 10m AOD) to a high point around 80m AOD at Navenby and this high point broadly follows the A607. The land gently recedes in elevation beyond Navenby, falling to around 40m AOD to the east of the Study Area of Scopwick Heath. Land use is generally agricultural, but with the villages of Harmston, Coleby, Navenby and Wellingore all falling within the Study Area.

3.1.3 The topography of the Principal Site Study Area is relatively flat, with existing ground levels under 20m AOD according to online Ordnance Survey mapping (Ref 15) with gentle undulations around the larger watercourses. There are flood plains associated with:

a. The River Witham (Main River) which flows through the Study Area;

b. The River Brant (Main River), a tributary of the River Witham which flows through the Study Area and meets the Witham to the south of South Hykeham; and

c. The South Hykeham Catchment, a Main River located to the northeast of the Study Area.

3.1.4 In addition, there are numerous Ordinary Watercourses within the Study Area that fall under the jurisdiction of the Lead Local Flood Authority (LLFA) (Lincolnshire County Council) or Internal Drainage Boards (Upper Witham Internal Drainage Board and Trent Valley Internal Drainage Board areas both cross into the Study Area). These watercourses drain surface water from the surrounding agricultural areas.

Geology, Groundwater and Soils

3.1.5 The bedrock and superficial geology for the area is identified by the BGS GeoIndex online mapping (Ref 8). Parts of the Principal Site are located on the Scunthorpe Mudstone Group, with a north-south geological boundary. To the east of this line is the Charmouth Mudstone Group. Overlying the bedrock geology there are several superficial strata. This includes alluvial and river terrace deposits in the floodplains of the River Brant and River Witham. Beyond the river valleys, the superficial deposits comprise the Fulbeck Sand and Gravel Member and Balderton Sand and Gravel Member. The Balderton Member is resting on pre-Quaternary bedrock and possibly, very locally, on the Skellingthorpe Clay Member of the Wolston Formation.

3.1.6 The Cable Corridor Study Area is split predominantly across four geological bedrock formations orientated north to south. The western area of the Cable Corridor surrounding the River Brant and extending west is underlain by the Charmouth Mudstone Formation. Immediately west of the villages of Harmston, Coleby and Wellingore is the Whitby Mudstone Formation, between the Charmouth Mudstone Formation to the west and the Lower Lincolnshire Limestone Member to the east. The Lower Lincolnshire Limestone Member extends towards Navenby Heath where it transitions to the Lincolnshire Limestone Member. In addition, there are pockets of the Upper Lincolnshire Limestone Member north of Metheringham Heath and south of Scopwick Heath.

3.1.7 Overlying the bedrock geology are similar superficial deposits as those of the Principal Site and these are mainly located in the area between Bassingham and Aubourn while the majority of the study area has no superficial deposits recorded. Those deposits that are present consist predominantly of isolated deposits of the Fulbeck Sand and Gravel Member, river terrace deposits and alluvium around the River Brant valley. There are also some sand and gravel superficial deposits west of Harmston and bands of Head deposits to the south east of Willingore.

3.1.8 GeoIndex (Ref 8) and Environment Agency data was used to review groundwater level observations across the Study Area. The shallowest groundwater level found across the Study Area was 1.8m deep at Thorpe-on-the Hill to the north of the Principal Site. However in most of the boreholes where date is available, groundwater depths ranged from 2.5m within the Scunthorpe Mudstone Group to around 11m deep within the Lincolnshire Limestone Formation. Groundwater level across the Site itself therefore appears to generally be in excess of 2.5m. Refer to **PEI Report Volume 1, Chapter 9: Water Environment** for further details.

Rainfall

3.1.9 Based on the Meteorological Office website (Ref 12), the nearest weather station is located in Waddington (NGR SK 98952 65231), approximately 3.5km north of the study area. Using data from this weather station, for the period 1991–2020, it is estimated that the Study Area experiences approximately 614mm of rainfall per year, with it raining more than 1mm on approximately 116 days per year, which are both low in the UK context. This is relevant to the whole Study Area.

Historical Channel Change

3.1.10 There are no clear alterations in the alignments of watercourses within the Study Area since the advent of available historic mapping at the end of the 19th century. However, this does not mean the channels are unmodified but merely that modifications pre-date available mapping. The area has been heavily managed for agriculture with this most clearly seen through the network of linear drainage ditches that form field margins. These channels are expected to be severely over deep, laterally disconnected from their floodplain, and not possessing of any notable diversity in channel form and process. This was confirmed by observations during the site walkover undertaken in October 2023.

3.2 WFD Status

WFD Status – Surface Water

3.2.1 Baseline WFD classifications for the seven WFD surface waterbody catchments in the study area are given in **Table 1**.

Table 1: Summary of the WFD status (Cycle 3) of surface water bodies in the study area

Water Body (ID)	Hydromorphological Designation	Overall Ecological Status	Biological Quality Elements	Physico-chemical Quality Elements	Hydromorphological Quality Elements	Chemical
Witham from Cringle Brook to Brant Lower Water Body (GB105030056780)	Heavily modified	Moderate	Good	Moderate	Supports good	Fail (2019)
Brant Lower Water Body (GB105030056770)	Heavily modified	Moderate	Moderate	Moderate	Supports good	Fail (2019)
South Hykeham Catchwater Water Body (GB105030062460)	Heavily modified	Moderate	Moderate	Moderate	Supports good	Fail (2019)
Dunston Beck Water Body (GB105030056230)	Heavily modified	Moderate	Bad	High	Supports good	Fail (2019)
Metheringham Beck Water Body	Heavily modified	Moderate	N/A	Moderate	Supports good	Fail (2019)

Water Body (ID)	Hydromorphological Designation	Overall Ecological Status	Biological Quality Elements	Physico-chemical Quality Elements	Hydromorphological Quality Elements	Chemical
(GB105030056210)						
Fleet Lower Catchment (trib of Trent) (GB104028058250)	Not designated artificial or heavily modified	Poor	Poor	Moderate	Supports good	Fail (2019)
Boultham Catchwater Drain Water Body (GB105030062380)	Heavily modified	Moderate	Moderate	Moderate	Supports good	Fail (2019)

WFD Status – Groundwater

3.2.2 The Proposed Development is underlain by three groundwater bodies. A summary of the WFD status of these groundwater bodies is given in **Table 2**.

Table 2: Summary of the WFD status of the screened-in groundwater bodies

WFD Parameter	Witham Lias	Witham Limestone Unit A	Lower Trent Erewash – Secondary Combined
Water body ID	GB40502G401400	GB40501G444800	GB40402G990300
Groundwater area (ha)	68356.717	34053.33	192440.179
Overall Status	Good	Poor	Good
Quantitative	Good	Poor	Good
Quantitative Status Elements	Good	Poor	Good
Quantitative Saline Intrusion	Good	Good	Good
Quantitative Water Balance	Good	Good	Good
Quantitative GWDTEs test	Good	Good	Good
Quantitative Dependent Surface Water Body Status	Good	Poor	Good
Chemical	Good	Poor	Good
Chemical Status Elements	Good	Poor	Good
Chemical Drinking Water Protected Area	Good	Good	Good
General Chemical Test	Good	Poor	Good

WFD Parameter	Witham Lias	Witham Limestone Unit A	Lower Trent Erewash – Secondary Combined
Chemical GWDTEs test	Good	Good	Good
Chemical Dependent Surface Water Body Status	Good	Good	Good
Chemical Saline Intrusion	Good	Good	Good

3.2.3 The Witham Lias and Lower Trent Erewash – Secondary Combined water bodies have Good Overall Status, while Witham Limestone Unit A is at Poor Overall Status.

3.3 Hydromorphological Quality Elements

3.3.1 A site walkover was conducted on 3 October 2023 in overcast, dry conditions, to assess the hydromorphological condition and quality of watercourses set to be crossed by the Cable Corridor. The findings of this are summarised in **Table 3**.

Table 3: Summary of the hydromorphological characteristics of watercourses within the study area

Photo	Crossing reference*	Description
	BL3	River Brant: EA Main River, 10m wide bank top to bank top and estimated bankfull depth of 5m. Channel is straight and has very little in the way of flow variation or diversity. Flow depth was around 0.5m. Large embankments have been built on both banks that will have entirely cut off any lateral connectivity. At the viewing point, water levels and channel characteristics may be heavily influenced by the presence of Sand Syke pumping station found at the confluence between the Brant and West Brant Syke.
	BL4	West Brant Syke: roughly 10m wide from bank top to bank top and estimated bankfull depth of 5m. Flow very slow moving and almost still. Channel is clearly artificial, straight, and trapezoidal in profile with little diversity in flow conditions and little chance of any lateral connectivity. Channel was heavily vegetated. The drain flows into the Brant through Sand Syke pumping station. An addition drain flowed into the watercourse from the north through a culvert.

Photo	Crossing reference*	Description
	BL6	Trapezoidal drainage ditch that does not visibly connect to any other watercourses. Channel was heavily vegetated and had a small amount of standing water at the bottom.
	BL7	Trapezoidal drainage ditch that runs parallel to Fen Lane. Watercourse was dry on day of inspection and heavily vegetated. It does not appear to connect to any other watercourse.
	WC1	Bank top to bank top width of 2m, heavily vegetated and disconnected channel. No water was visible on the day of inspection, and channel was heavily covered in terrestrial vegetation.
	WC3	Trapezoidal drain, 1m wide bank top to bank top and water depth of 0.1m. Water does not appear to be flowing and channel is heavily vegetated by brambles and terrestrial vegetation.
	WC4	The River Witham: Environment Agency Main River, 8m bank top to bank top. Embankments have been built which will limit lateral connectivity, but the channel still exhibits a degree of flow variation and geomorphological process.

Photo	Crossing reference*	Description
	WC5	Tributary of the Witham, deep, trapezoidal, and linear channel. Small degree of flow variability and large assemblage of macrophytes.
	WC6	Channel around 2.5m bank top to bank top and densely vegetated by brambles. Small amount of water at the base of the channel but did not appear to be flowing. Channel was trapezoidal and linear in profile.
	WC10	Drainage channel running underneath road through culvert. Water is very turbid and grey in colour, suggesting water quality issues. Water has almost imperceptible flow. Channel is trapezoidal and over deep, around 1m wide bank top to bank top and bankfull depth estimated at 1m.
	WC11	Trapezoidal drainage channel, over deep and linear. Bank top to bank top width is 3m, with bankfull depth at 2m. Slow amount of water in the channel (around 0.2m) but very slow flowing and of no variability.

** Locations shown on **PEI Report Volume 2 Figure 9-1**.*

3.4 Biological Quality Elements

3.4.1 There is only one site which has been sampled for fish, invertebrates and macrophytes by the Environment Agency within the study area (Ref 13). This site is located within the Witham Upper / Witham from Cringle Brook to Brant Lower WFD waterbody at NGR SK9180062800. Within this waterbody fish, invertebrates and macrophytes were given a WFD classification of Good, High and Poor, respectively, in 2022.

3.4.2 The Environment Agency has sampled seven sites within the water body for fish, all of which were last sampled in 2023, although only one of these was within the study area. Within these surveys, nine different species have been recorded. Invertebrates monitored within the Study Area had a mean Biological Monitoring Working Party (BMWP) Average Score Per Taxon (ASPT) of 5.27 from surveys between 2021 and 2024. This is a high score, reflecting the classification of high for invertebrates.

3.4.3 Nine of macrophyte taxa were recorded at the Environment Agency sample site during the most recent survey in 2020. Six of these species were flowering plants, two were algae and one was moss.

3.5 Physico-chemical Quality Elements

3.5.1 Water quality data for the River Witham at Aubourn Bridge, River Brant at Blackmore Bridge, South Hykeham Catchment at South Hykeham headwaters, Dunston Beck at Dunston Beck Spring and Metheringham Beck at Metheringham downstream of a sewage treatment works has been interrogated from the Environment Agency's Water Quality Archive website (Ref 14). Data has been compared to WFD Environmental Quality Standards (EQS) and is tabulated within **PEI Report Volume 1, Chapter 9: Water Environment**. A summary is provided below. Refer to **PEI Report Volume 2, Figure 9-1: Surface Water Features and their Attributes** for monitoring locations.

3.5.2 The water quality within the Witham at Aubourn Bridge is slightly alkaline in nature with an average pH of 8.09 and falls within the threshold for WFD high classification based on data sampled here from 2008 to 2023. A 10th percentile dissolved oxygen saturation of 80.30% falls within the high WFD classification (with 70% being high).

3.5.3 Water quality within the River Brant at Blackmore Bridge is circum-neutral with an average pH of 7.85 but falls within the WFD high classification based on data sampled here from 2000 to 2023. A 10th percentile dissolved oxygen saturation of 38.79% falls within the poor WFD classification (with <45% being poor). A 90th percentile of 1.76 mg/l and 0.0020 mg/l for BOD and ammonia respectively, fall under the high WFD classifications.

3.5.4 Water quality within the South Hykeham Catchwater at South Hykeham is circum-neutral with an average pH of 7.79 and falls within the WFD high classification based on data sampled here from 2012 to 2023. A 10th percentile dissolved oxygen saturation of 51.40% is within the poor WFD classification (with 45% being required for moderate). A 90th percentile for BOD of 6.0 mg/l falls within the moderate WFD classification (with >5 mg/l being the threshold to moderate). A 90th percentile for ammonia of 0.012 mg/l falls within the high WFD classification.

3.5.5 Water quality within the Dunston Beck WFD water body at Dunston Beck Spring is circum-neutral with a pH of 7.7 but falls within the WFD high classification based on data sampled here from 2000 to 2019. A 10th percentile dissolved oxygen saturation of 89.6% falls within the WFD high classification. There has been no monitoring of BOD at this site.

3.5.6 Water quality within Metheringham Beck at Metheringham Ds Stw is circum-neutral with an average pH of 7.61 but falls within the WFD high classification based on data sampled here from 2012 to 2023. A 10th percentile dissolved oxygen saturation of 76.1% is within the good WFD classification. A 90th percentile for BOD of 5.75 mg/l falls within the moderate classification and 0.003 mg/l for ammonia both fall within the high WFD classifications.

3.5.7 Nitrate and orthophosphate values are somewhat elevated for all monitored sites and indicates probable pressure from the surrounding agricultural land uses through use of fertilisers and other products which may runoff to the watercourses. Refer to **PEI Report Volume 1, Chapter 9: Water Environment** for further details.

4. WFD Screening

4.1 WFD Screening

4.1.1 The purpose of the WFD screening stage as outlined in PINS WFD Advice (Ref 4) is to identify a zone of influence of the Proposed Development and to determine whether that influence has the potential to adversely impact upon WFD water body receptors; this approach has been taken in this assessment and is outlined in this section.

4.1.2 A study area of 1km from the Proposed Development boundary has been considered in order to identify water bodies that are potentially hydrologically connected to the Proposed Development and potential works associated with the Proposed Development that could cause direct impacts.

4.1.3 The screening stage also identifies specific activities of the Proposed Development that could affect receptor water bodies' WFD status, and which should be carried forward to subsequent stages of the assessment. Justification is provided where water body receptors are screened out and are not carried forward through the assessment. Water bodies or activities screened 'out' of the assessment are not considered further at the impact assessment stage, subject to agreement being obtained from the Environment Agency.

Screening of WFD Water Bodies

4.1.4 The Proposed Development interacts with seven WFD surface water body catchments and three WFD groundwater bodies (Ref 5). WFD Screening of these water bodies is provided in **Table 4**. Watercourses such as smaller tributaries within each of the WFD water body catchments that may be impacted by the Proposed Development have been included in this assessment. Any other remaining downstream water bodies not mentioned below are considered sufficiently far downstream to avoid impacts of the Proposed Development and are therefore screened out of further assessment.

Table 4: Screening of WFD water bodies potentially impacted by the Proposed Development

Water Body ID	Screening Outcome	Justification
Witham from Cringle Brook to Brant Lower Water Body (GB105030056780)	**In**	WFD surface water body may be directly impacted by the Proposed Development due to a range of activities that would interact with the local watercourse network during construction, operation, and decommissioning phases.
Brant Lower Water Body (GB105030056770)		
South Hykeham Catchwater Water Body (GB105030062460)	**Out**	The wider WFD catchments for these water bodies covers some of the Study Area and so there is potential for hydrological connectivity to the watercourse via the drains and tributaries that extend into the Site. However, due to the small scale of the drains and tributaries, potential impacts are deemed unlikely and insignificant. It is anticipated that any water quality impacts related to construction runoff or spillages that have potential to enter these tributaries will be adequately mitigated by a Construction Environmental Management Plan (CEMP), which will be secured through a DCO requirement, and supported by an associated Water Management Plan (WMP) which will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction including requirements for water quality monitoring. The CEMP will be standard procedure for the Proposed Development and will describe the principles for the protection of the water environment during construction. A **Framework CEMP** is included in **PEI Report Volume 3, Appendix 3-A**. Similarly, during decommissioning there would be a Decommissioning Environmental Management Plan (DEMP) in place. During operation the Drainage Strategy for the Proposed Development would ensure no pollution to waterbodies that might be in hydrological connectivity to these watercourses. Given this mitigation and the lack of any direct works to these waterbodies, it is considered that they can be screened out of further assessment.
Dunston Beck Water Body (GB105030056230)		
Metheringham Beck Water Body (GB105030056210)		
Fleet Lower Catchment (trib of Trent) (GB104028058250)		
Boultham Catchwater Drain Water Body (GB105030062380)		

<table>
<tr><th>Water Body ID</th><th>Screening Outcome</th><th>Justification</th></tr>
<tr><td>Witham Limestone Unit A (GB40501G444800)</td><td rowspan="3">In</td><td rowspan="3">Activities relating to the construction and operation of the Proposed Development have been assessed in terms of their potential impact upon these groundwater water bodies. There are potential anticipated impacts at the water body scale, therefore assessment of impacts to groundwater is scoped in.</td></tr>
<tr><td>Witham Lias (GB40502G401400)</td></tr>
<tr><td>Lower Trent Erewash – Secondary Combined (GB40402G990300)</td></tr>
</table>

Screening of Activities

4.1.5 As described in Section 1, the Proposed Development comprises a number of activities, some of which present a potential risk to the WFD status of water bodies. These components and activities are listed in **Table 5** together with a screening assessment.

Table 5: Screening of the Proposed Development's Activities

Activity	Description	Screening Outcome	Justifications
Solar PV panels and PV mounting structures	Solar PV panels convert sunlight into electrical energy. The lowest part of the panel will have a minimum ground clearance of 0.8m; the highest part of the panel will have a maximum height of 3.5m above ground level. The panels will be mounted on galvanised steel frames, which are typically driven or screwed into the ground. The maximum depth of these piles will be 2m for south facing fixed panel arrangement and 4m for single axis tracker panel arrangement, subject to local ground conditions. Use of piles will avoid the creation of an impermeable surface on the ground or the need for extensive earthworks. A 10m buffer will be maintained from all watercourses. In archaeologically sensitive areas, solar PV panels may be mounted on concrete blocks, subject to further archaeological investigation and agreement with the relevant stakeholders.	**Out -** Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300) **N/A -** Witham Limestone Unit A (GB40501G444800)	There will be no direct hydromorphological impacts to watercourses given the 10m buffer between infrastructure and any water features. A Preliminary Surface Water Drainage Strategy (**PEI Report Volume 3, Appendix 9-D**) has been developed in accordance with planning policy guidance to manage surface water runoff from the operational Principal Site. This would be discharged to surface watercourses or to ground following attenuation to ensure no increase in discharge rates and provision of water quality treatment of runoff water. This will be secured through a detailed drainage strategy which would be a requirement of the DCO. Use of mounting structures will avoid sealing the ground with impermeable surfaces and so the Site impermeable area will remain largely consistent with its pre-development state. However, runoff from the solar PV Panels will alter the existing routing of runoff. To prevent ponding occurring around the solar PV panels, a series of boundary and routing swales will be constructed to convey surface water runoff away from the solar PV panels and towards receiving watercourses. SuDS in the form of swales will be incorporated to control any increase in the rate of flow towards receiving watercourses, and to provide treatment for any contaminants collected on areas of hardstanding. The rate of runoff from each development location within the whole Principal Site would ensure nil detriment in terms of no increase in runoff rate from the Site to receiving watercourses.

Activity	Description	Screening Outcome	Justifications
			In addition, the risk of agricultural diffuse pollution would be reduced from the change in land use as the application of agro-chemicals, inorganic and organic fertilisers to crops would cease in the areas of solar PV panels during the operational life of the Proposed Development. As no continuous foundations are in the design and given that an examination of boreholes across the Study Site found the groundwater level is typically in excess of 3.5m, the shallow, regularly spaced discrete PV Panel foundations are considered to have a negligible impact on groundwater flow. The Study Area is not known to have a significant history of potentially contaminating land uses such as landfill (Ref 16). The installation of the mounting structures to a maximum depth of 4 m below ground is not considered to create a significant risk of mobilising contaminants.
Supporting infrastructure (inverters, transformers, and switchgear)	The supporting infrastructure will comprise of inverters, transformers, and switchgear which will be mounted on concrete foundations to create 'Solar Stations'. There would be approximately 84 Solar Stations within the Principal Site. There are two types of inverter which may be used: a central inverter as part of the Solar Station, or string inverters which are connected to the rear of the Solar PV tables. One string inverter unit is sufficient for 20-40 panels. Around 150 central inverters would be required as part of the Solar Stations, each measuring 6 x 2.5 and 3m in height.	**Out** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300)	Infrastructure will not be located within proximity of a watercourse and so there is no mechanism for direct hydromorphological impacts to surface water bodies. A Preliminary Drainage Strategy is included in **PEI Report Volume 3, Appendix 9-D** providing for the attenuation of surface water runoff from the operational Principal Site including areas of hardstanding associated with supporting infrastructure. In accordance with planning policy guidance, runoff from the Principal Site would be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. This will be secured through a detailed drainage strategy which would be a requirement of the DCO. Transformers will be installed with suitable bunds to contain any oil spillage in case of an oil-leakage event. Bunds will be designed to contain at least 110% of the volume of the oil to

Activity	Description	Screening Outcome	Justifications
	Containers would be mounted on adjustable legs on areas of hardstanding. Transformers are required to step up the voltage of the electricity generated before it reaches the Onsite Substation. It is anticipated that there will be 84 transformers. Each transformer will be 12.5m x 2.5m and 3m in height. Switchgear are used to de-energise equipment and are housed in containers with a local footprint of 6.5m x 2.5m and 3m in height. Approximately 300 switchgears could be located across the Principal Site.	**N/A** – Witham Limestone Unit A (GB40501G444800)	ensure there is some tolerance to prevent breaching of the bund. Under normal conditions any rainwater collected within the bund will be removed by use of special pump, which automatically switches off if it detects the smallest presence of oil in the water. Pumps will be linked to control and monitoring equipment to raise alarms if oil is detected. Given the above mitigation, there are considered to be no mechanisms for impacts to surface water bodies from the Solar Stations. Indicative foundations for the Principal Site specify that it will have a maximum depth of 2m. An examination of boreholes across the Study Site found the groundwater level to typically be in excess of 3.5m, with no instances of the groundwater being within 2m of the surface (Ref 8). As such, there would be negligible or no impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies in question.
Battery and Energy Storage System (BESS) Compound or BESS adjacent to the Solar Stations	The BESS will allow for the storage of energy at times of low demand and release to grid at times when demand is high or when solar irradiance is lower, known as load shifting. It is expected that there will be 480 megawatt hours (MWh) of BESS capacity, which would necessitate 300 batteries to be distributed throughout the Site (referred to as 'DC-coupled' arrangement) and located alongside the Solar Stations, or located at a single BESS Compound (referred to as 'AC-coupled' arrangement). The 480MWh BESS	**Out** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300)	Infrastructure will not be located within proximity of a watercourse and so there is no mechanism for direct hydromorphological impacts to surface water bodies. A Preliminary Drainage Strategy is included in **PEI Report Volume 3, Appendix 9-D** providing for the attenuation of surface water runoff from the areas of hardstanding associated with the BESS. In accordance with planning policy guidance, runoff from the Principal Site Park would be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. This will be secured through a detailed drainage strategy which would be a requirement of the DCO.

Activity	Description	Screening Outcome	Justifications
	capacity could be fully charged by only 2 hours of peak production of the Proposed Development. Each battery container would measure 6.5m x 2.5m and 3m in height, and located on areas of hard standing, with a minimum clearance of 0.1m beneath the container and the hardstanding. The BESS switchgear and control room would be located alongside the battery containers and will have a maximum dimension up to 4.5m in height, and 12.5m by 2.5m footprint. In case of a DC-coupled BESS option, the battery containers will be located alongside the Solar Stations in a common compound each of which have dimensions 33m x 27m. In case of AC-coupled BESS option, all battery containers and the inverters, transformers, and switchgear associated with the BESS will be located within the BESS Compound, while the inverters, transformers and switchgear associated with the PV panels will be located within the Solar Stations. Maximum foundation depth of the BESS and BESS containers would be 1m (concrete base of monolith plinth). It is anticipated that emergency fire water would be stored within onsite water tanks	**N/A** – Witham Limestone Unit A (GB40501G444800)	In the unlikely event of a malfunction to one of the battery arrays, there will be a range of integrated controls that will activate depending on the extent and severity of the event. Engagement with the emergency services (Fire and Rescue Service) will be undertaken as part of the Applicant's pre-application work and is required for the preparation of the Framework BSMP to be presented with the DCO application. The production of the detailed BSMP (prior to construction) and the implementation of the measures within it will be secured through DCO Requirement. Given the above mitigation which will be secured through the DCO, there are considered no mechanisms for impacts to surface water bodies, however, this will be reviewed once engagement with the Fire and Rescue Service has taken place. Indicative foundations for the BESS specify that it will have a maximum depth of 1m. An examination of boreholes across the Study Site found the groundwater level to typically be in excess of 2.5m, with no instances of the groundwater being within 1m of the surface (Ref 8). As such, there would be negligible or no impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies.

Activity	Description	Screening Outcome	Justifications
	and allowance has been made for fire water storage. The ES will contain details of the water supply, tank dimensions and storage capacities.		
Electricity export via high-voltage cable located within the Cable Corridor and connection to the National Electricity Transmission System	The electricity generated by the Proposed Development is expected to be exported via a 400kV connection between the Onsite Substation and a new National Grid 400kV substation in the Navenby Area (the latter is not part of this Proposed Development). The cabling will be installed underground. The cable will be installed under an open trench method requiring a 30m to 40m working width, with trenches approximately 3 m wide and up to 3m deep. Where specific techniques are required such as micro-tunnelling, boring, or horizontal directional drilling (HDD) to avoid sensitive watercourses, this will be investigated. At this stage, only the crossing of the River Brant has been confirmed to use HDD (or similar approach). The remainder of watercourse crossings for the Cable Corridor are assumed to be via open cut methodologies as a worst case. The current Cable Corridor is shown in **PEI Report Volume 2, Figure 1-2**.	**In -** Brant Lower Water Body (GB105030056770) **Out -** Witham Lias (GB40502G401400), Witham Limestone Unit A (GB40501G444800) **N/A -** Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Lower Trent Erewash – Secondary Combined (GB40402G990300)	There is potential for direct hydromorphological impacts to the channel and riparian zone if intrusive open cut installation methods are proposed (as currently assumed as a worst case). The River Brant will be crossed by HDD, or similar non-intrusive technique, but would not be directly impacted with the installation depth being a minimum of 5m below the bed and launch and receive pits being at least 10m from the channel margins (or 16m from the landward toe of flood defences where present). There is potential for indirect impacts to all watercourses to be crossed from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils (and drilling muds should HDD be used) if this runoff is not carefully managed. In addition there is potential for drilling muds to break out into the watercourse causing pollution (known as ‘hydraulic fracture’ or ‘frac out’). At this stage, this is intended to be managed through a site-specific Hydraulic Fracture Risk Assessment which would be developed prior to construction following further investigation of specific ground conditions at the crossing locations, and appropriate mitigation developed in line with best construction practice. Directional drilling, or other trenchless techniques, would be undertaken by a specialist contractor and the water column above the drill path would be continuously monitored during drilling.

Activity	Description	Screening Outcome	Justifications
			Mitigation for the intrusive open-cut crossings is proposed to include a pre-works morphology survey of the channel of each watercourse to be crossed prior to construction. This is to ensure that there is a formal record of the condition of each watercourse prior to commencement of works. The survey is a precautionary measure so that should there be any unforeseen adverse impacts there is a record against which any remedial action can be determined. Water flow would be maintained by damming and over pumping during cable installation. Works would be carried out in the drier months where possible as this would reduce the risk of pollution propagating downstream, particularly in the case of ephemeral watercourses. Once the watercourses are reinstated, silt fences, geotextile matting or straw bales would be used initially to capture mobilised sediments until the watercourse has returned to a settled state. It will be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity. Regular observations of the watercourses will also be required post-works during vegetation re-establishment of the banks, especially following wet weather, to ensure that no adverse impacts have occurred. These requirements will be described in the Water Management Plan (which will be an appendix to the detailed CEMP). As both the exact route of the Cable Corridor and any crossing techniques used is yet to be confirmed, this activity must be screened in at this stage for further consideration in terms of WFD compliance. Due to the thickness of overlying superficial deposits and the shallow depth of Proposed Development infrastructure, it is

Activity	Description	Screening Outcome	Justifications
			unlikely that groundwater in the bedrock aquifers will be encountered by the Proposed Development. An examination of boreholes across the Study Site found the groundwater level to typically be in excess of 2.5m, with no instances of the groundwater being within 1.8m of the surface (Ref 8). The profile of the cable ducting is considered to be small compared to the spatial and vertical extent of the aquifers. Furthermore, given that cable trenches will generally have a relatively shallow depth (although slightly deeper at crossing locations), a negligible impact on groundwater flow is predicted from installation of the Grid Connection Cable overall. As such, there would be negligible or no impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies. Impact on the groundwater WFD water bodies can therefore be screened out.
Onsite cabling	Low voltage cabling between PV modules and the inverters (typically via 1.5/1.8kV cables) will typically be located above ground level (along a row of racks), fixed to the mounting structure, and then underground (between racks and in the central inverter's and or transformer input). Medium voltage cables (around 33kV) are required between the transformers, switch gear and the Onsite Substation. The dimensions of trenching will vary subject to the underground cabling which will be based on the number of cables they contain. The trench will typically be up to 1m wide with a maximum depth of 1.2m	**In** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770) **Out** – Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300)	Indicative trench depths for the onsite cabling specify that it will have a maximum depth of 1.2m. An examination of boreholes across the Study Area found the groundwater level to typically be in excess of 2.5m, with no instances of the groundwater being within 1.8m of the surface (Ref 8). As such, there would be negligible or no impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies. The River Witham will be crossed by HDD, or similar non-intrusive technique, but would not be directly impacted with launch and receive pits at least 10m from the channel margins (rising to 16m from the landward toe of flood defences and 100m where a potential Otter hold is known to be present)). Cables would be installed at least 5m below the river bed.

Activity	Description	Screening Outcome	Justifications
	and will be dependent on the method of installation, ground conditions and number of cables laid in parallel. Subject to engagement with utility providers there may be a requirement for horizontal directional drilling (HDD) within the Principal Site to cross beneath existing buried utilities, watercourses and roads. It is known at this stage that there would be HDD beneath the River Witham. Other potential crossings are assumed at this stage to be via open cut techniques. Data cables will be required throughout the Principal Site to allow for the monitoring and control during operation, such as the collection of data on solar irradiance from pyranometers. The data cables would typically be installed within the same trench and alongside the electrical cables.	**N/A** – Witham Limestone Unit A (GB40501G444800)	There is potential for indirect impacts to all watercourses to be crossed from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling muds (water based) if this runoff is not carefully managed. There are potential impacts from groundwater ingress to excavations (e.g. launch, receiving and jointing pits) and the risk of 'break out' of drilling muds into watercourses associated with HDD. The potential for drilling fluids to break out into the watercourse would be mitigated by a site specific Hydraulic Fracture Risk Assessment. Where open cut watercourse crossings are required, these would adopt the same mitigation measures as outline above in relation to electricity export via the Cable Corridor. As the watercourse crossing locations and techniques are still to be confirmed, this activity must be screened in at this stage for further consideration in terms of WFD compliance.
Onsite Substation and control building	A new Onsite Substation will be located within the Principal Site which will include transformers, switchgear and metering equipment required to facilitate the export of electricity to the National Grid. The substation would have up to three transformers and would have a maximum footprint of up to 140m x 100m in plan and up to 13.5m in height. These maximum dimensions may be refined	**Out** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash –	Indicative foundations for the Principal Site specify that it will have a maximum depth of 2m, which will likely be above the water table across most of the site, based on groundwater data available on the Geoindex website (Ref 7) and provided by the Environment Agency. As such, there would be negligible or no impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies. Infrastructure will not be located within 10m of a watercourse, and so there are no mechanisms for hydromorphological impacts to surface water bodies.

Activity	Description	Screening Outcome	Justifications
	downwards as design and environmental assessment work continues. The substation would also include a warehouse and storage building with a maximum footprint of 36m x 15m x 7.2m in height and a control building which would be 20m x 20m and up to 6m in height. This will include office space and welfare facilities as well as operational monitoring and maintenance equipment. The Onsite Substation will be connected to the Solar Stations and BESS via Medium Voltage Distribution Cables in order to collect electricity (at 33kV) from those components of the Proposed Development. The Onsite Substation will convert the electricity between 33kV and 400 kV to enable electricity transmission to the proposed Navenby Substation NETS via the Grid Connection Cable.	Secondary Combined (GB40402G990300) **N/A** – Witham Limestone Unit A (GB40501G444800)	A Preliminary Drainage Strategy is included in **PEI Report Volume 3, Appendix 9-D** providing for the attenuation of surface water runoff from the areas of hardstanding associated with the Onsite Substation and control building. In accordance with planning policy guidance, runoff from the Principal Site would be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. This will be secured through a detailed drainage strategy which would be a requirement of the DCO. Transformers will be installed with suitable bunds to contain any oil spillage in case of an oil-leakage event. Bunds will be designed to contain at least 110% of the volume of the oil to ensure there is some tolerance to prevent breaching of the bund. Under normal conditions any rainwater collected within the bund will be removed by use of special pump, which automatically switches off if it detects the smallest presence of oil in the water. Pumps will be linked to control and monitoring equipment to raise alarms if oil is detected.
Fencing, security, and ancillary infrastructure	A fence will enclose the operational areas of the Proposed Development. The fence is likely to be a stock proof mesh-type security fence with wooden posts and approximately 2m in height. Pole mounted internal facing closed circuit television (CCTV) systems installed at a height of up to 3.5m are also likely to be deployed around the perimeter of the operational areas. Access gates will be of similar construction and height as the	**Out** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash –	Infrastructure will not be located within 10m of a watercourse and so there is no mechanism for direct hydromorphological impacts to surface water bodies. While there may be some potential to encounter superficial groundwater, given the limited extent of below ground works and their discrete nature, it is anticipated there would be negligible impact to the groundwater body, particularly given the large scale of the WFD groundwater bodies.

Activity	Description	Screening Outcome	Justifications
	perimeter fencing. Clearances above ground, or the inclusion of mammal gates will be included to permit the passage of wildlife.	Secondary Combined (GB40402G990300) **N/A** – Witham Limestone Unit A (GB40501G444800)	
Site access and access tracks	During construction there would be approximately 19 site access points which would provide access to an internal network of access tracks enabling access to each field parcel. These are illustrated on **PEI Report Volume 2, Figure 3-1**. The internal access tracks would typically be 5 m with passing bays provided as required. The internal access tracks will likely be constructed of compacted stone or gravel with excavation kept to a minimum, or for secondary tracks left as grass. Where drainage is required a ditch or a swale may be located downhill of the internal access track to control any potential for surface water run-off.	**In** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), **Out** – Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300) **N/A** – Witham Limestone Unit A (GB40501G444800)	Where watercourses/ditches are crossed for access (either temporarily during construction or permanently during operation), it is assumed that new crossings will be culverted as a worst case, although this will be re-appraised at the ES stage. At present it is anticipated that there will be eight crossings for access tracks. Existing crossings will be used where possible and the number of crossings required will be reduced wherever possible. Where new culvert structures are required (assumed as a worst case), it will be expected that the least impacting design that is reasonably practicable is proposed (e.g. arch rather than box culverts, and box culverts in preference to pipes etc.). The maximum width would be 6m to allow sufficient width for the access tracks. The crossings will be sized at detailed design in order to not impact on flow conveyance and be sized to ensure capacity for the peak flow rate. The culvert inverts will be buried below the natural bed level to allow for natural bed formation and passage of sediments, typically at least 0.3m. Where arch culverts are not provided, it has been assumed that the design of the structure will allow for a naturalised bed to be formed through the structure. There is varying guidance as to what minimum depth is required, but there are also design considerations. Therefore, this will be considered at detailed design stage. Furthermore, the crossing should be perpendicular to the

Activity	Description	Screening Outcome	Justifications
			flow, and connectivity maintained for aquatic species and riparian mammals, with a mammal ledge if there is sufficient room. Where new culverts are required, length-for-length watercourse enhancements are required in each case to mitigate the impacts, and to ensure compliance against WFD objectives. This length-for-length watercourse enhancement also applies to culvert extensions, and the requirements will be outlined in a WFD Mitigation and Enhancement Strategy (to be produced post consent as a requirement of the DCO). The affected watercourses are generally ephemeral/intermittently flowing. Nevertheless, when flowing the potential for adverse water quality impacts exists from runoff containing fine sediments and chemical spillages relating to use of plant adjacent to the watercourses, and structural works to install crossings in the riparian margins and over the watercourses. Given the limited potential for conveyance in these generally dry watercourses, any impact would be expected to remain very localised. In addition, where possible works would be timed to coincide with drier periods. Best practice measures as outlined in the CEMP and Water Management Plan would minimise any adverse water quality impacts to these ditches. There is limited potential for impacts to the groundwater body, as no significant changes in runoff patterns compared to existing are expected from the internal access tracks. Despite the above mitigation, the location and manner of access tracks is yet to be finalised and so this activity is screened in at this stage of assessment.
Landscaping and	The Proposed Development will involve new planting, field boundary	**Out** – Witham from Cringle Brook to Brant	Enhancements will improve biodiversity and will be of benefit to hydromorphology across the Principal Site.

Activity	Description	Screening Outcome	Justifications
biodiversity enhancement area	enhancement and planting of seed mixes within the solar PV areas and within the wider Principal Site. Planting would be used to provide screening, mitigation for wildlife, and habitat enhancement.	Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300), Witham Limestone Unit A (GB40501G444800)	
Foul Water Drainage	There will be welfare facilities associated with the Proposed Development for up to four permanent FTE members of staff, with up to 20 being in attendance for periods of maintenance, cleaning or solar infrastructure replacement. Given the low daily occupancy only small volumes of foul drainage will be generated. At the time of writing it is not known how any wastewater from permanent welfare facilities will be managed. However, this is anticipated to consist of a self-contained independent non-mains domestic storage and/or treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered	**Out** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770), Witham Lias (GB40502G401400), Lower Trent Erewash – Secondary Combined (GB40402G990300), Witham Limestone Unit A (GB40501G444800)	As there would be no anticipated discharge of foul water to a waterbody, and only small volumes would either be discharged to a foul sewer indirectly via a suitable waste management contractor, or directly with Anglian Water consent, no further WFD assessment of foul waste from the Proposed Development is proposed.

Activity	Description	Screening Outcome	Justifications
	recycling and waste management contractor. Should a connection to a foul sewer be required as an alternative option, Anglian Water would be consulted at the appropriate time. A final option may involve a direct discharge of treated effluent to a watercourse, but this would require a much more detailed assessment and a permit from the Environment Agency. At this point in time, it is considered that this option is not viable, and it is not considered any further. Should it be required in the future it would be considered by the Environment Agency under the water discharge activity regime in accordance with the Environmental Permitting (England and Wales) Regulations 2016 which ensures the effects of any such discharge would be appropriately regulated.		
Surface Water Outfalls	New drainage outfalls to watercourses may be required, and the need for these will be confirmed at the ES stage.	**In** – Witham from Cringle Brook to Brant Lower Water Body (GB105030056780), Brant Lower Water Body (GB105030056770) **Out** – Witham Lias (GB40502G401400),	It is proposed that the location, position and orientation of any new drainage outfalls required will be carefully determined and informed by a hydromorphological survey to minimise any adverse local impacts on river processes. Appropriate micro-siting of the outfall will minimise loss of bank habitat, the need for bed scour or hard bank protection, and localised flow disturbance or disruption to sediment transport processes. It will also avoid the creation of 'dead' spaces with sedimentation and vegetation blockage risks and

Activity	Description	Screening Outcome	Justifications
		Lower Trent Erewash – Secondary Combined (GB40402G990300), Witham Limestone Unit A (GB40501G444800)	to that effect it is not proposed that outfalls are recessed into the bank. Surface water outfalls can impact the hydromorphological quality and water quality of the surface water bodies. While hydromorphologically sensitive design is intended, this will need to be reviewed when further design detail is available, and so surface water outfalls are screened in. No anticipated mechanism for impacts to the groundwater body from surface water outfalls.

5. Construction Risks

5.1 Potential Construction Phase Risks

5.1.1 During construction the following adverse impacts may occur:

a. Impacts on surface water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site run-off;

b. Potential changes in on-site and off-site flood risk due to changes in the volume, rate and flow of surface water runoff from the construction site, which could mobilise pollutants into water bodies;

c. Construction activities such as earth works, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation;

d. Contamination of surface waters, groundwater and soil could result from leakage and spills of fuels, oils, chemicals and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water body. Contamination may reduce water quality and impact aquatic fauna and flora; and

e. Any construction works that impede on the floodplain have the potential to increase rate and volume of runoff, and increase risk of blockages in watercourses that could lead to flow being impeded, and a potential rise in flood risk. Earthworks may also alter flow pathways and the compaction of the ground and vegetation clearance will also increase the rate and volume of runoff.

5.2 Construction Mitigation

5.2.1 Construction would be managed using a CEMP. It would include a Water Management Plan (WMP) as a technical appendix that would provide site specific information of how the risks to the water environment from potential pollution and the risk of physical damage will be managed. These measures require Contractor input and thus the WMP would not be developed until during the detailed design phase and pre-construction planning period.

5.2.2 Works would be carried out in accordance with established good practice and the CEMP, which would include information on:

a. Permissions and Consents;
b. Management of Construction Site Runoff;
c. Management of Construction Site Spillage Risk; and
d. Management of Flood Risk.

5.2.3 It is anticipated that all WFD related construction risks could be adequately mitigated with appropriate planning and management as outlined in the CEMP and WMP.

5.2.4 Refer to **PEI Report Volume 1, Chapter 9: Water Environment** and **PEI Report Volume 3 Appendix 3-A: Framework CEMP** for further detail on the mitigation of construction stage risks.

6. Conclusion

6.1.1 A WFD screening exercise has been undertaken following guidance in the Planning Inspectorate Advice (Ref 4). Proposed work activities that could influence water bodies have been outlined and the WFD water bodies that could potentially be affected have been identified through consideration of the 1km study area.

6.1.2 The following water bodies have been identified within the Study Area and screened in for further consideration:

a. Witham from Cringle Brook to Brant Lower Water Body (GB105030056780);
b. Brant Lower Water (GB105030056770);
c. Witham Lias (GB40502G401400);
d. Witham Limestone Unit A (GB40501G444800); and
e. Trent Lower Erewash – Secondary Combined (GB40402G990300).

6.1.3 The Proposed Development will have to demonstrate that there is no deterioration in any of the identified baseline classifications, and no prevention of future improvement for these classifications. If this cannot be achieved, Regulation 19 derogation would be required.

6.1.4 When the design details for the Proposed Development are defined further at the ES stage for assessment, the following WFD assessment stages will be advanced, for inclusion within a full WFD Assessment:

a. **Stage 2: WFD Scoping** – For each water body identified in Stage 1, a qualitative assessment informed by readily available data and the site walkover survey will be carried out to identify the effects and potential impacts of the relevant activities to specific WFD receptors based on the relevant water bodies and their water quality elements. The assessment is made taking into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the proposed works) and good practice mitigation (measures that would occur with or without input from the WFD assessment process); and

b. **Stage 3: WFD Impact Assessment** – A detailed assessment of the water bodies and activities carried forward from the WFD screening and scoping stages.

6.1.5 These stages of assessment will be undertaken in consultation with the Environment Agency, LLFA and Internal Drainage Boards to ensure an appropriate level of assessment.

7. References

Ref 1 The Water Environment (Water Framework Directive) (England and Wales) Regulations (2016), available online at: https://www.legislation.gov.uk/UKSI/2017/407/CONTENTS/MADE

Ref 2 Environment Agency (2016) Water Framework Directive Risk Assessment: how to assess the risk of your activity.

Ref 3 Environment Agency (2015) Protecting and improving the water environment - Water Framework Directive compliance of physical works in rivers. Doc No. 488_10.

Ref 4 The Planning Inspectorate (2024) The Water Framework Directive - Advice Note Eighteen: The Water Framework Directive. Available at: https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-the-water-framework-directive

Ref 5 Environment Agency (2019); Catchment Data Explorer Tool. Available at: https://environment.data.gov.uk/catchment-planning/ [Accessed 2 January 2024].

Ref 6 Environment Agency (2019). DEFRA's Multi Agency Geographical Information for the Countryside website. Available at: https://magic.defra.gov.uk/MAGICMAP.ASPX [Accessed 2 January 2024].

Ref 7 Historic mapping: National Library of Scotland (2024). [Accessed 2 January 2024).

Ref 8 British Geological Survey borehole and online mapping (GeoIndex) (2024). [Accessed 3 January 2024)

Ref 9 Cranfield University (2024). Cranfield Soil and Agrifood Institute Soilscapes viewer, available at: http://www.landis.org.uk/soilscapes/ [Accessed 2 January 2024].

Ref 10 Bing Maps (2019). [Accessed 2 January 2024].

Ref 11 National River Flow Archive (2024). [Accessed 2 January 2024).

Ref 12 Met Office (2024). Available at: https://www.metoffice.gov.uk/ [Accessed 2 January 2024]

Ref 13 Environment Agency Fish and Ecology Data Explorer (2024). Available at: https://environment.data.gov.uk/ecology/explorer/ [Accessed 6 August 2024]

Ref 14 Environment Agency Water Quality Archive website (2024). Available at: https://environment.data.gov.uk/water-quality/view/landing [Accessed 6 August 2024]

Ref 15 Ordnance Survey (2018); Open Data. [Accessed 6 April 2023]

Ref 16 Historic Landfill Sites (2024); Open Data. Available at: https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites [Accessed 29 August 2024]

Ref 17 CIRIA (2015) The SuDS Manual (C753). Available at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C753