One Earth Solar Farm

Volume 6.0 Environmental Statement [EN010159]

Volume 3: Technical Appendices Supporting ES Volume 2

Appendix 7.4: Stage 1 Water Framework Directive Screening Assessment

December 2025

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Report

One Earth Solar Farm

Water Framework Directive - Screening Assessment

For One Earth Solar Farm Ltd

~~2 December 2025~~16 December 2025

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1 Introduction

1.1 Overview and Aims

Logika Group Ltd were commissioned by One Earth Solar Farm Ltd to prepare a Water Framework Directive (WFD) Screening Assessment to accompany the planning application for the One Earth Solar Farm Project.

The aims of this WFD Screening Assessment are to identify the extent to which the Proposed Development is likely to affect water bodies. In undertaking this, context is provided to the overall Proposed Development, likely works to existing watercourses/waterbodies, and a summary of the baseline conditions is provided of the existing watercourses/waterbodies.

Furthermore, embedded mitigation within the design and construction are set out, keeping in mind the overarching aims of the WFD, to ensure that the Proposed Development will not:

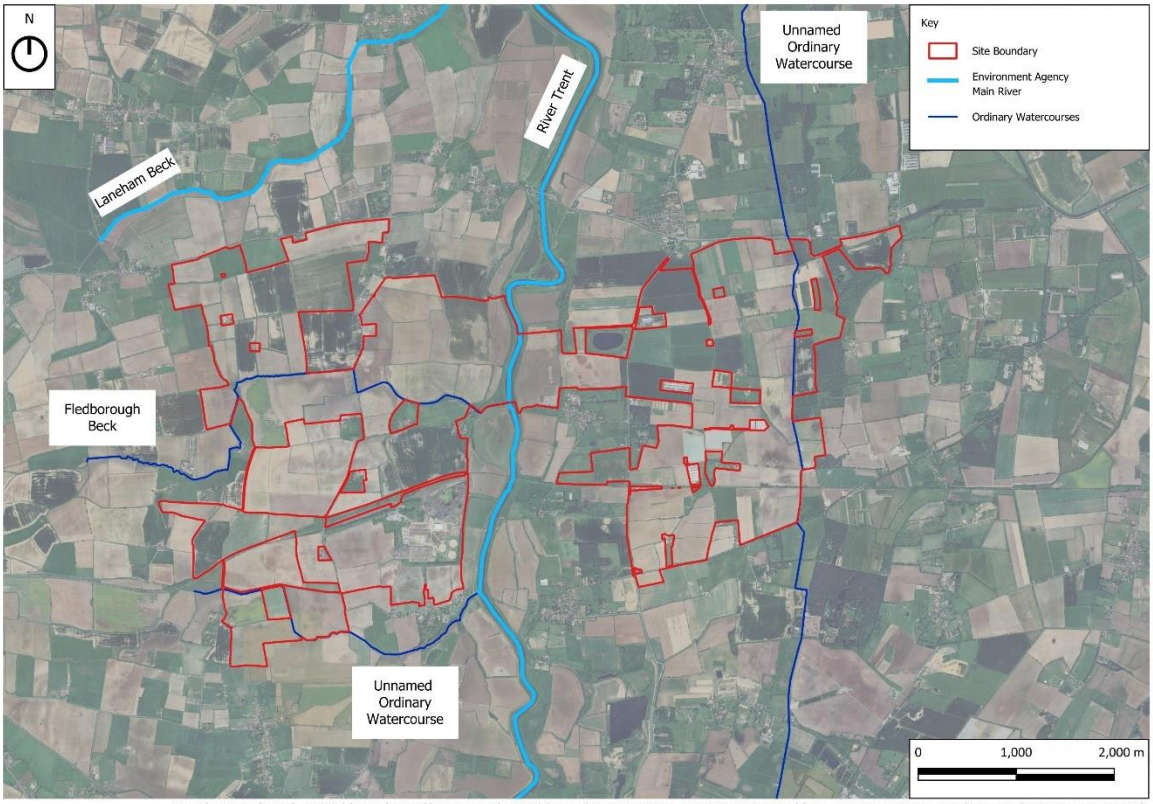
- Cause or contribute to deterioration of status; or
- Jeopardise the water body achieving good status.

1.2 Scheme Background

The site (hereafter referred to as 'the Site') covers an area of approximately 1,409 hectares (ha) and is located across two county boundaries. Approximately 1,203ha of the Site lies within Nottinghamshire County Council and the remaining 206ha is located within Lincolnshire County Council.

The Site currently comprises agricultural fields located to the east and west of the River Trent which bisects the Site, flowing from south to north. Hedgerows, trees and woodland form the boundaries to many of the fields within the Site. The Proposed Development Site boundary is shown in **Figure 1-1**.

Figure 1-1: Site Location Plan



Google Maps (2025). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 21st January 2025)

A topographic survey was carried out by Above Surveying Ltd and is included in **Appendix A1**.

Given the scale of the Site, ground levels vary considerably across the area. The highest elevation is at approximately 27m Above Ordnance Datum (AOD) east of the River Trent and the lowest elevation is approximately 4.5m AOD along the Trent riverbanks. Ground levels typically fall towards the ordinary watercourses and main river within the Site.

1.3 Development Proposals

The Proposed Development comprises the construction, operation and maintenance, and decommissioning of a solar (PV) array electricity generating facility. The project includes solar PV panels, Battery Energy Storage Systems (BESS), onsite sub-stations, and associated grid connection infrastructure which will allow for the generation and export of electricity to the High Marnham sub-station. The Applicant has secured a connection agreement with National Grid which will allow export and import up to 740 megawatts (MW) of electricity to the High Marnham sub-station.

The development proposals are included in **Appendix A2**. For further information regarding the Proposed Development, refer to **ES Volume 1, Chapter 5: Description of the Proposed Development [EN010159/APP/6.5]**).

1.4 Anticipated Works to Existing Watercourses

As part of the development proposals, any works to the existing watercourses are to be limited, however it is anticipated that the following will be undertaken:

- Proposed surface water drainage outfalls from areas of significant hardstanding (such as the sub-station and battery storage areas). Surface water discharges from these areas will be restricted in line with relevant policy, with treatment provided (discussed further in Section 4).
- Bridging over watercourses to facilitate access. These have been kept to a minimum and any openings required will be sized accordingly to ensure there would be no constraint to flows.
- Two artificial otter holts are proposed on the ditch network, and a new ditch is proposed in the ecological mitigation area (floodplain grazing marsh) near the River Trent which mimics a historic alignment.
- Ongoing management of drainage ditches including the clearance of any silt build-up as required, with the aim of clearing no more than one third of each ditch in each year, and from one bank/side only. Additionally, this will include bankside vegetation management every other year (in autumn), alternating from one bank to the opposite bank, maintaining vegetation cover all year round.

In addition to the elements noted above, there will be a need for cables to cross beneath the watercourses in a number of locations.

To ensure that access and ecological corridors are maintained, it is proposed that the following buffers will be provided between the top of bank of watercourses and any built development (panels, sub-stations, inverters and battery storage).

- A minimum 10m buffer from all ordinary watercourse and field drains/ditches, (in excess of the 9m required within Trent Valley Internal Drainage Board's Byelaws).
- A minimum 16m buffer from the River Trent (main river) to any built development (as described above). It is worth noting that the buffers from the River Trent actually extend far beyond the 16m minimum.

1.5 Consultation and Engagement

Following responses from the Environment Agency (EA) to the Preliminary Environment Information Report (PEIR), a meeting was requested to discuss the requirement and potential scope of any WFD Screening Assessment.

It was intended that this would be discussed in a meeting held in September 2024, however, there was no specialists present from the EA to discuss water quality matters or WFD requirements. As set out in the meeting minutes (**Appendix A3**), the requirement for a WFD Assessment to be undertaken was queried and it was ultimately agreed that given there was no EA specialist available, Logika would set out specific queries which could be circulated by the EA following the meeting.

The queries noted above were set out in November 2024 and in another meeting held with the EA in January 2025, the requirement for a WFD Assessment was raised again, highlighting the submission timescales. As set out in the meeting minutes (**Appendix A3**), the EA noted that they were looking for responses to Logika's queries.

In late January 2025, the EA provided an email response (**Appendix A3**), predominantly making reference to the *"Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive*[1]*"* guidance and indicating that screening should be undertaken in the first instance. It was

[1] Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive - GOV.UK

noted that the requirement for scoping and impact assessment can be discussed following their review of the screening.

2 WFD Screening Approach and Background

2.1 WFD Background

The Water Environment Regulations 2017 (Water Framework Directive) (England and Wales) transpose the Water Framework Directive into UK law.

The WFD protects surface waters including rivers, lakes, transitional waters, coastal waters and groundwater and its aim are:

- To enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystem.
- To ensure progressive reduction of groundwater pollution.
- To reduce water pollution, especially by Priority Substances and Certain Other Pollutants under Annex II of the Environmental Quality Standards Directive 2008/105/EC.
- To support mitigating the effects of floods and droughts.
- To achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015 (Article 4), or good ecological potential for artificial or heavily modified water bodies.
- To support sustainable water use.

2.2 River Basin Management Plan

Each river basin district has a River Basin Management Plan (RBMP) which consists of a collection of documents that describe how waters are managed, together with information about the river basin district in data tables and maps.

The aim of the river basin management plans is to enhance nature and the natural water assets that are the foundation of everyone's wealth, health and wellbeing, and the things people value, including culture and wildlife.

2.2.1 Humber River Basin Management Plan

The Site lies within the Humber RBMP[2] and the environmental objectives covered by the plan are:

- Preventing deterioration of the status of surface waters and groundwater.
- Achieving objectives and standards for protected areas.
- Aiming to achieve good status for all water bodies.
- Reversing any significant and sustained upward trends in pollutant concentrations in groundwater.
- Cessation of discharges, emissions and losses of priority hazardous substances into surface waters.

[2] Humber river basin district river management plan: updated 2022 - GOV.UK

- Progressively reducing the pollution of groundwater and preventing or limiting the entry of pollutants.

2.3 WFD Screening

Screening should identify the extent to which the proposed development is likely to affect water bodies. Where impacts are 'screened out' from further assessment, this should be clearly justified.

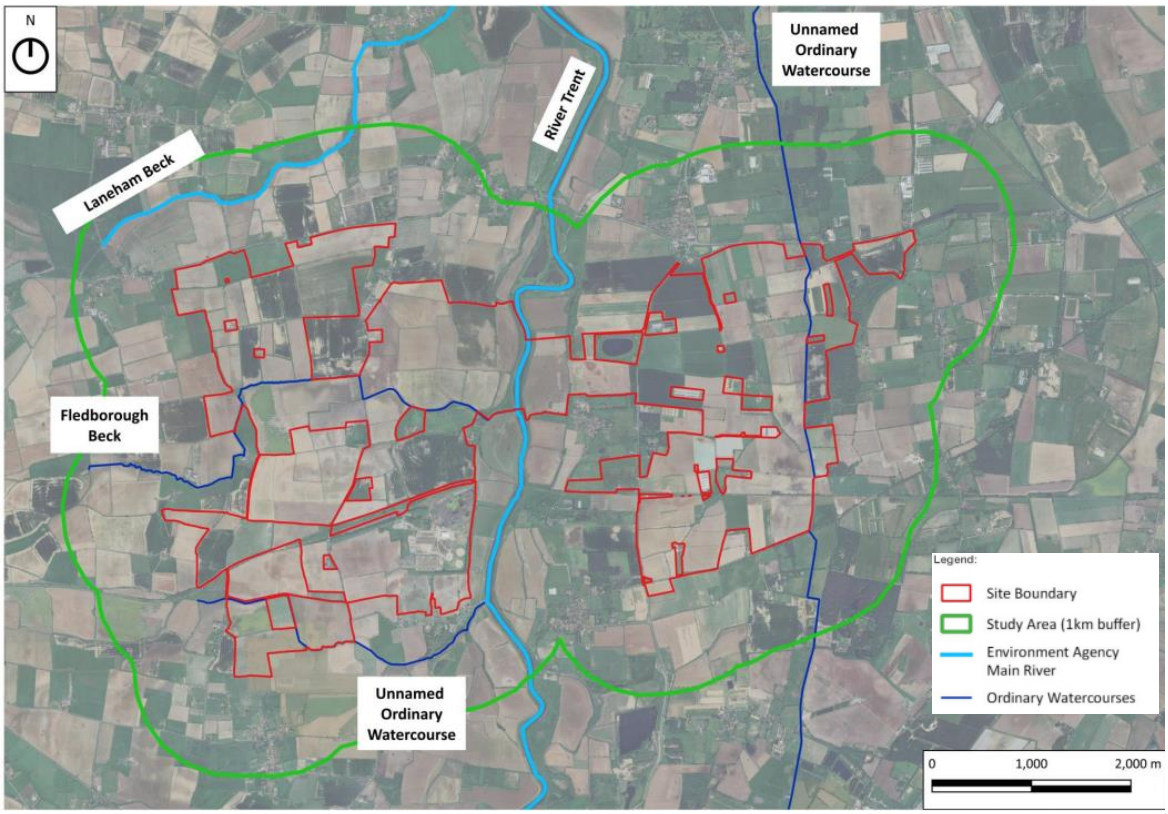
The screening stage should:

- Show all relevant WFD water bodies on a map or plan;
- Identify the zone or zones of influence based on specific activities and/or characteristics of the proposed development that could affect the identified water bodies; and
- Identify any specific activities and/or characteristics of the proposed development that have been screened out and why.

2.3.1 Approach to Screening

The Screening Assessment set out within Section 3 considers the baseline condition of the groundwater bodies within the Study Area set out in **Figure 2-1** below and **Figure 3-2**.

Figure 2-1: Main Rivers and Ordinary Watercourses within Study Area



Given the nature of hydrology and hydrogeology, it is difficult to accurately define a Study Area as water is a flowing element. Therefore, in the absence of any specific guidance relating to solar developments and in accordance with Design Manual for Roads and Bridges (DMRB) LA 113 (2020), a 1km buffer has been considered appropriate, as sufficient distance is provided to encompass

catchments associated with the Site and to enable the deposition of silts in overland flows and dilution of any concentrated pollutants. Any impacts to waterbodies beyond 1km from the Site are considered to be negligible.

Given that the proposed submission is outline only, it is difficult to confirm with certainty what the development proposals associated with the existing watercourses/waterbodies will be. Prior to detailed design, it is similarly difficult to clarify the associated activities, as construction approaches are not confirmed and a contractor is not on board at this stage.

With the above in mind, the following approach has been taken to the Screening Assessment:

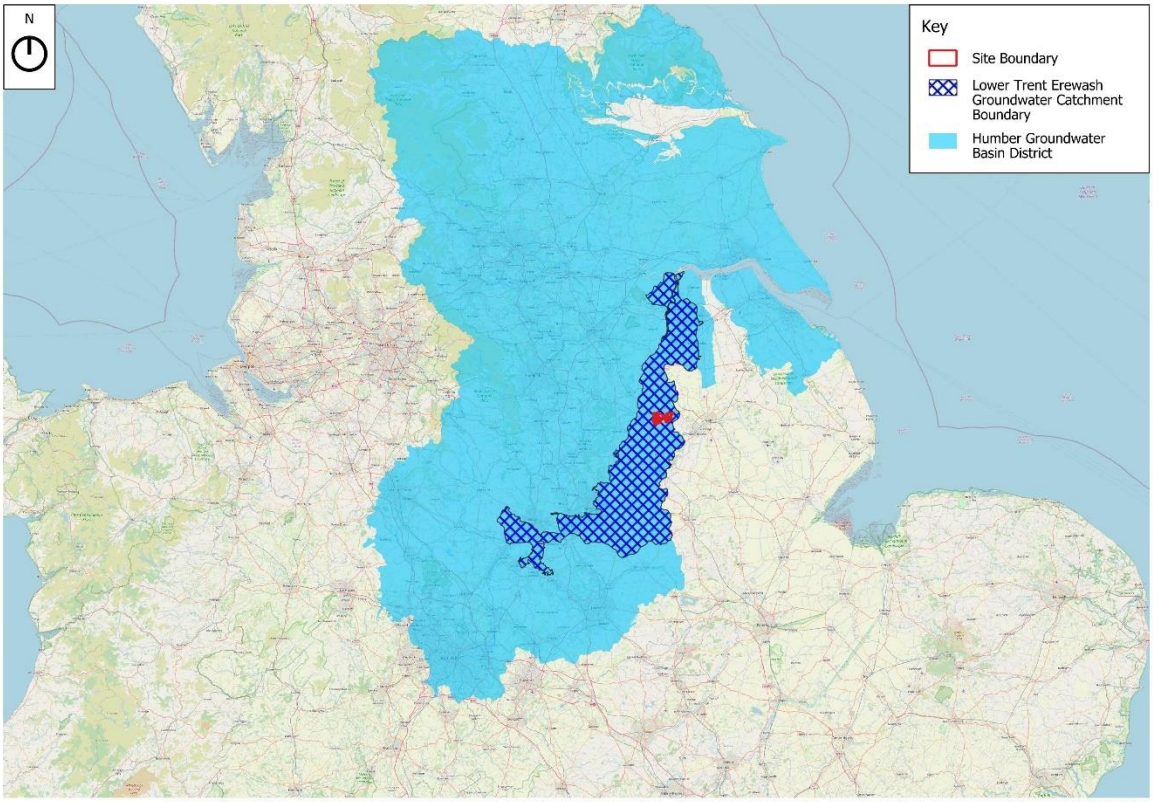
- The baseline conditions of existing waterbodies / watercourses have been set out and reviewed.
- Embedded mitigation measures within the design and construction mitigation have been considered in relation to the proposed works to the watercourses.
- Taking into account the mitigation proposed, the resulting effect that the proposed works could have on the objectives of the WFD and RBMP have then been considered and it has been determined whether further assessment is required.

3 Screening Assessment

3.1 Groundwater

The Site lies within the Humber Groundwater Management Catchment and is within the Lower Trent Erewash - Secondary Combined Groundwater Body, both of which are illustrated in **Figure 3-1**.

Figure 3-1: Groundwater Catchment and Groundwater Body Extent



Google Maps (2025). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 24th February 2025)

The baseline conditions of the groundwater body have been obtained from the EA catchment data explorer[3] and are summarised in **Table 3-1.** As can be seen, the overall water body status is confirmed to be Good.

[3] Lower Trent Erewash - Secondary Combined | Catchment Data Explorer | Catchment Data Explorer

Table 3-1: Summary of Lower Trent Erewash - Secondary Combined Water Body Information

Parameter	Detail
Water Body Name:	Lower Trent Erewash - Secondary Combined Water Body
Water Body ID:	GB40402G990300
Groundwater Management Catchment:	Humber
Waterbody Type:	Groundwater
Groundwater Area (ha):	192,440
Overall Water Body Status (2019):	Good
Target Water Body Status:	Not classified
Quantitative Status Element:	Good
Chemical Status:	Good

3.1.1 Aquifers, Source Protection Zones and Water Protected Areas

The Mercia Mudstone Group bedrock units are classified as a secondary B aquifer, with the Penarth Group classified as a secondary undifferentiated aquifer. Where superficial units are present, these are categorised as secondary A aquifers. There is a small area of secondary undifferentiated aquifer where till deposits are present between Ragnall and Darlton.

There are no groundwater SPZs within the majority of the study area. Three groundwater SPZs are present within a very localised area to the north of the Order Limits within the study area, near Dunham Bridge. The SPZs range from Zone 1 Inner Protection Zones to Zone 2 Subsurface Activity, but are all thought to be associated with Anglian Water groundwater abstractions.

There is one additional groundwater abstraction point located within the Order Limits, with a further four being located within the study area, but outside the Order Limits. The abstraction location within the Order Limits is located at High Marnham Power Station, for industrial processing, however, this abstraction location is no longer active. The abstraction points that are within the study area, but outside the Order Limits, are all for general farming (spray irrigation). One of these, located near Ragnall, is listed as being using as a domestic supply, in addition to the general farming use.

Drinking Water Groundwater Safeguard Zones are established around public water supplies where additional pollution control measures are needed. The Order Limits are not located within or nearby to any Drinking Water Safeguard Zone (Groundwater).

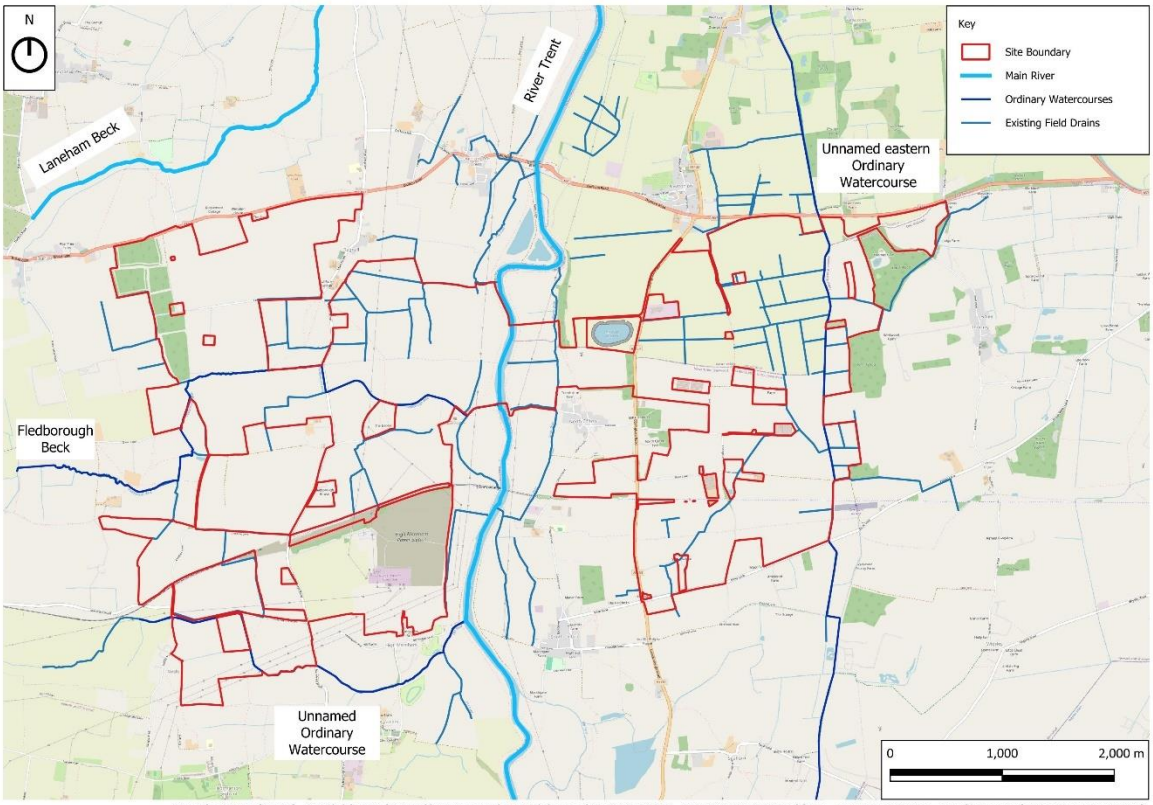
3.2 Watercourses

There are a number of existing watercourses within the Study Area. These are illustrated in **Figure 3-2** (and **Figure 2-1**) and summarised below:

- The River Trent – A main river which flows in a northerly direction through the centre of the Site.
- The Fledborough Beck – An ordinary watercourse which flows west to east through the central areas of the western parcel of the Site, before ultimately discharging to the River Trent.
- The Laneham Beck – An ordinary watercourse which flows west to east to the north west of the Site, ultimately discharging to the River Trent.

- An unnamed ordinary watercourse which flows west to east through the southern area of the western parcel of the Site. This ordinary watercourse ultimately discharges to the River Trent.
- An unnamed ordinary watercourse which flows in a northerly direction through the eastern area of the Site. This ordinary watercourse is a tributary of the Foss Dyke which ultimately connects to the River Trent approximately 4km north of the Site.
- A number of field drains and ditches within the Site itself which are ultimately in connectivity with either the ordinary watercourses noted above or the River Trent.

Figure 3-2: Main River and Existing Watercourses



Google Maps (2025). Available at: https://www.google.co.uk/maps/@53.2272889,-0.7682997,6738m/data=!3m1!1e3?entry=ttu (Accessed 21st January 2025)

The baseline conditions of the following watercourses have been assessed:

- The River Trent
- The Fledborough Beck
- The Laneham Beck
- Unnamed Ordinary Watercourse in the west
- Unnamed Ordinary Watercourse in the east

Although there are a number of existing field drains throughout the Site, these are all tributaries of the main rivers or ordinary watercourses listed below and their condition is assumed to be the same.

3.2.1 Baseline Data Collection

The watercourses noted above do not appear within the EA's Water Body Summary Table[4] referred to within the Clearing the Water's[5] guidance. The Cycle 3 data (available from the EA Catchment Data Explorer[6]) has therefore been used and is summarised in within the tables under the following headings.

River Trent and Unnamed Ordinary Watercourse in the West

The River Trent and the Unnamed Ordinary Watercourse in the west both lie within the catchment of the "Trent from Carlton on Trent to Laughton Drain Water Body". The unnamed ordinary watercourse in the east is also within this catchment, however this is discussed further under the following headings with regards to the Sewer Drain which is downstream of the Site.

Baseline conditions of the Trent from Carlton on Trent to Laughton Drain are summarised within **Table 3-2** below.

Table 3-2: Summary of Trent from Carlton on Trent to Laughton Drain Water Body Information

Parameter	Detail
Water Body Name:	Trent from Carlton on Trent to Laughton Drain Water Body
Water Body ID:	GB104028058480
River Basin District Name:	Humber River Basin District
Water Body Type:	River
Waterbody Total Area (ha):	15,322
Ecological Status (2022):	Moderate
Chemical Status (2019):	Fail
Target Water Body Status and Deadline:	Good by 2027 – Low Confidence
Hydromorphology Status:	Artificial
Modified Waters Designation:	Not classified
Higher Sensitivity Habitats:	None
Lower Sensitivity Habitats:	None
Phytoplankton Status:	Not classified
History of Harmful Algae:	Not classified
WFD Protected Areas within 2km:	None
Reasons for Not Achieving Good Status:	• Transport Drainage • Sewage Discharge

[4] wfd_water_body_summary_table_2023_update_submission.xlsx
[5] Water Framework Directive assessment: estuarine and coastal waters - GOV.UK
[6] England | Catchment Data Explorer

Parameter	Detail
	• Poor Soil Management • Unknown (Pending Investigation)

Fledborough Beck

The extent of the Fledborough Beck within the Site, falls within the "Fledborough Beck Catchment (tributary of Trent Water Body". Baseline conditions of the Fledborough Beck are summarised within **Table 3-3** below.

Table 3-3: Summary of Fledborough Beck Catchment (tributary of Trent) Water Body Information

Parameter	Detail
Water Body Name:	Fledborough Beck Catchment (tributary of Trent) Water Body
Water Body ID:	GB104028058290
River Basin District Name:	Humber River Basin District
Water Body Type:	River
Waterbody Total Area (ha):	1,292
Ecological Status (2022):	Moderate
Chemical Status (2019):	Fail
Target Water Body Status and Deadline:	Good by 2027 – Low Confidence
Hydromorphology Status:	Not designated artificial or heavily modified
Modified Waters Designation:	Not designated artificial or heavily modified
Higher Sensitivity Habitats:	None
Lower Sensitivity Habitats:	None
Phytoplankton Status:	Not classified
History of Harmful Algae:	Not classified
WFD Protected Areas within 2km:	None
Reasons for Not Achieving Good Status:	• Poor Nutrient Management • Land Drainage • Drought

Laneham Beck

The Laneham Beck is outside of the Site Boundary but is within the defined Study Area. The Laneham Beck falls within two waterbodies, namely:

- The Tuxford Beck Catchment (tributary of the North Beck)
- The North Beck Catchment (tributary of the Trent).

The baseline conditions of the Laneham Beck based on the above water bodies are summarised within **Table 3-4** and **Table 3-5** below.

Table 3-4: Summary of Tuxford Beck Catchment (tributary of the North Beck) Water Body Information

Parameter	Detail
Water Body Name:	Tuxford Beck Catchment (tributary of the North Beck) Water Body
Water Body ID:	GB104028058320
River Basin District Name:	Humber River Basin District
Water Body Type:	River
Waterbody Total Area (ha):	3,598
Ecological Status (2022):	Moderate
Chemical Status (2019):	Fail
Target Water Body Status and Deadline:	Moderate by 2015
Hydromorphology Status:	Not designated artificial or heavily modified
Modified Waters Designation:	Not designated artificial or heavily modified
Higher Sensitivity Habitats:	None
Lower Sensitivity Habitats:	None
Phytoplankton Status:	Not classified
History of Harmful Algae:	Not classified
WFD Protected Areas within 2km:	None
Reasons for Not Achieving Good Status:	• Sewage Discharge • Poor Nutrient Management • Misconnections • Poor Livestock Management

Table 3-5: Summary of North Beck Catchment (tributary of Trent) Water Body Information

Parameter	Detail
Water Body Name:	North Beck Catchment (tributary of Trent) Water Body
Water Body ID:	GB104028058311
River Basin District Name:	Humber River Basin District
Water Body Type:	River
Waterbody Total Area (ha):	1,190
Ecological Status (2022):	Moderate
Chemical Status (2019):	Fail
Target Water Body Status and Deadline:	Good by 2027 – Low Confidence
Hydromorphology Status:	Not designated artificial or heavily modified
Modified Waters Designation:	Not designated artificial or heavily modified
Higher Sensitivity Habitats:	None
Lower Sensitivity Habitats:	None
Phytoplankton Status:	Not classified
History of Harmful Algae:	Not classified
WFD Protected Areas within 2km:	None
Reasons for Not Achieving Good Status:	• Sewage Discharge • Poor Nutrient Management • Poor Livestock Management

Eastern Unnamed Ordinary Watercourse

As set out previously, the unnamed ordinary watercourse in the east is shown to be within the catchment for the "Trent from Carlton on Trent to Laughton Drain Water Body" however, the watercourse is a tributary of the Sewer Drain to the north east. A summary of the baseline conditions for the "Sewer Drain Catchment Water Body" has therefore been provided in **Table 3-6** below.

Table 3-6: Summary of Sewer Drain Catchment (tributary of Trent) Water Body Information

Parameter	Detail
Water Body Name:	Sewer Drain Catchment (tributary of Trent) Water Body
Water Body ID:	GB104028058300
River Basin District Name:	Humber River Basin District
Water Body Type:	River
Waterbody Total Area (ha):	1,359
Ecological Status (2022):	Moderate
Chemical Status (2019):	Fail
Target Water Body Status and Deadline:	Moderate by 2015
Hydromorphology Status:	Heavily Modified
Modified Waters Designation:	Not classified
Higher Sensitivity Habitats:	None
Lower Sensitivity Habitats:	None
Phytoplankton Status:	Not classified
History of Harmful Algae:	Not classified
WFD Protected Areas within 2km:	None
Reasons for Not Achieving Good Status:	• Sewage Discharge • Poor Livestock Management • Poor Soil Management

3.2.2 Surface Water Protected Areas and Abstractions

Drinking Water Protected Areas (Surface Water) are defined as locations where raw water is abstracted from rivers, lakes, canals or reservoirs for human consumption. The Order Limits are partially located within the Drinking Water Protected Area (Surface Water) associated with the 'Trent from Carlton-on-Trent to Laughton Drain' waterbody. This Protected Area covers the majority of the eastern area of the Order Limits and portions of the western area. The Protected Area is classified as 'currently not at risk'.

Drinking Water Safeguard Zones (Surface Water) are defined as catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water), and are identified

where the Protected Area is classified as "at risk" of failing the WFD drinking water protection objectives. The Order Limits are not located within or nearby to any Drinking Water Safeguard Zone (Surface Water).

Through discussions with Anglian Water, it is understood that there is an Anglian Water abstraction point located just downstream of the Proposed Development (at national grid reference SK 82020 73882 which this is believed to be the "Hall River Trent Intake" but its official title is to be confirmed by Anglian Water).

4 Operational Embedded Measures

As part of the proposed works, there is a requirement for embedded mitigation measures to be included for the operational stages. These measures inherently ensure that there are no negative impacts to the existing watercourses and waterbodies within the Site, and are summarised below.

The **Outline Operational Environmental Management Plan [EN010159/APP/7.5.3]** and **Outline Battery Safety Management Plan [EN010159/APP/7.11.2]** have been prepared in support of the application, and measures relating to mitigation of operational activities are set out within this. An OEMP and BSMP will be produced to ensure that all operational activities relating to the watercourses are assessed in further detail, and appropriate mitigation is put in place. Those related to the watercourses and waterbodies are summarised below.

4.1 Embedded Mitigation Measures – Operational

4.1.1 Watercourse Offsets

As set out previously, the following offsets between watercourses and built development (panels, sub-stations, inverters and battery storage) have been embedded in to the design to provide access and ecological corridors.

- A minimum 10m buffer from all ordinary watercourse and field drains/ditches.
- A minimum 16m buffer from the River Trent (main river). It is worth noting that the buffers from the River Trent actually extend far beyond the 16m minimum.

These offsets are considered to mitigate against potential effects to the watercourses from an ecological and hydromorphological perspective, as the Proposed Development is set away from the watercourses.

4.1.2 Bridging of Watercourses

As set out previously, the need for bridging over ordinary watercourses to facilitate access has been kept to a minimum. Where these are required, a clear span structure will be preferential to minimise potential impacts to the watercourses. If any localised culverting is required, these will be sized accordingly.

Given the outline nature of the proposals, the location and form of bridging is yet to be confirmed. However, this would be confirmed at detailed design and further liaison will be held with the EA and Internal Drainage Board (IDB).

4.1.3 Drainage Strategy – SUDS

A Flood Risk Assessment[7] (FRA), including surface water drainage strategy has been prepared to support the application. As part of this, an outline surface water drainage strategy has been prepared which sets out how rainfall landing on the Site will be managed. The strategy for the principle areas of development (i.e. solar panel areas and BESS and Sub-station Areas) is summarised below:

[7] Logika, February 2025. Flood Risk Assessment and Outline Drainage Strategy. Document Reference: EN010159/APP/6.21

Solar Panels

In line with research undertaken by Wallingford HydroSolutions[8], solar farms are not considered to result in significant increases in runoff when compared to the existing greenfield situation. This is on the basis that runoff from the panels themselves will simply drop directly to the ground where the natural regime will be maintained. In line with the advice set out by Wallingford HydroSolutions, it is proposed that the following measures will be implemented to ensure that any impacts of the solar panels are minimised:

- Disturbance to existing vegetation during construction will be minimised;
- Any disturbed vegetation will be re-established to maintain good ground cover across the Site;
- Regular inspection and maintenance will be undertaken to ensure that vegetation cover is adequate; and
- Fencing will be provided where required to avoid any disturbance to the vegetation by livestock or similar.

In addition to the above, it is proposed that strategic Sustainable Drainage Systems (SuDS) features such as filter drains, swales and basins/scrapes are incorporated within the solar array areas to encourage infiltration to the ground, and also provide ecological and biodiversity benefits. This approach has been agreed with the LLFA.

BESS and Sub-station Areas

The sub-stations and battery storage areas are considered to represent areas of hardstanding where surface water runoff would be generated rather than simply infiltrating to the ground (due to the inclusion of impermeable lining being incorporated to prevent potential contamination from infiltrating to ground). With this in mind, a more traditional drainage assessment has been prepared for these areas and the fundamental principles of the strategy are set out below:

- Surface water runoff from the hardstanding areas is to be restricted to greenfield rates (Qbar) for all events up to and including the 1 in 100 year plus 40% climate change event.
- Restricted runoff is to be achieved through the use of attenuation in the form of open green detention basins. It is proposed that runoff from the basins will discharge to the surrounding field drains/ordinary watercourses, mimicking the existing situation.
- SuDS in the form of permeable surfacing, swales, filter drains and detention basins are proposed which provide sufficient treatment of runoff prior to discharge to the surrounding watercourses. The level of treatment required and provided is quantified within the FRA, in line with CIRIA guidance.
- The potential for a fire to occur at the BESS and Sub-station locations has been considered, and a containment strategy has been set out within the detention basin, to prevent the potential for contaminated runoff discharging to the surrounding watercourses. This will include the provision of an automated penstock valve downstream of the attenuation, and any potentially contaminated water would be tankered away from the Site (and disposed of in line with best practice).
- It is proposed that the drainage system and SuDS features servicing the BESS and Sub-station areas will be impermeably lined to prevent any potential contamination to groundwater should the fire

[8] Wallingford HydroSolutions, December 2017. [Here comes the sun - WHS (hydrosolutions.co.uk), accessed September 2023]

suppression system be activated and contaminated fire water be within the system. Should a fire occur, contaminated gravel would be removed and replaced as part of decontamination works to prevent the subsequent re-release of contaminants. As part of these works, measures would be taken to minimise the potential to compromise the impermeable lining, should any damage occur then repair or localised replacement would be undertaken.

4.1.4 Ecological Works

With regards to the artificial otter holts, new ditch within the floodplain grazing marsh, and desilting and vegetation clearance of watercourses, these are not considered to require embedded mitigation from an operational and design perspective and construction is fundamentally where there are potential implications (should mitigation not be provided).

There will however, be a requirement to undertake maintenance works (such as vegetation clearance) associated with these features. These works would be undertaken in line with best practice and in line with a maintenance schedule which will be set out at detailed design.

These measures are considered to be positive measures with regards to ecological and watercourse status.

It is not proposed that harsh chemicals or pesticides will be utilised for vegetation management. The only situation in which herbicides may be used is to control and manage the spread of any non native or invasive plant species should these be found. Full details of vegetation management will be outlined within the Landscape and Ecology Management Pan (LEMP), post consent.

4.2 Operational Conclusion

It is concluded that the operational development will not cause or contribute to deterioration of the existing watercourses or groundwater bodies, or jeopardise their potential to achieve good status. This is based on the following:

- Offsets are to be provided between the built development and existing watercourses.
- Any bridging requirements are to be limited and clear span wherever feasible. Should culverting be required, these would be sized accordingly.
- Surface water runoff will be controlled to match natural rates (i.e. greenfield rates) prior to discharge to the existing watercourses, and sufficient treatment will be provided through the inclusion of SuDS features (including containment of contaminated fire runoff).
- Impermeable lining of the SuDS features will be provided to the BESS and Sub-station areas, to prevent any potential contamination to groundwater.

5 Construction Mitigation

Outline Construction Environmental Management Plan [EN010159/APP/7.4.3] has been prepared in support of the application, and measures relating to mitigation of construction activities are set out within this. A CEMP will be produced to ensure that all construction activities relating to the watercourses are assessed in further detail, and appropriate mitigation is put in place. This will be prepared in consultation with the EA. Those related to the watercourses and waterbodies are summarised below.

5.1 Construction Mitigation Measures

5.1.1 Staff Awareness and Training

The Contractor(s) will ensure that construction staff are fully aware of the potential impact to water resources associated with the construction works and procedures to be followed in the event of an accidental pollution event occurring. This would be included in the Site induction and training, with an emphasis on procedures and guidance to reduce the risk of water pollution.

5.1.2 Pollution Plans

Plans to deal with accidental pollution would be included within the CEMP(s) prior to commencement of construction. Any necessary equipment (e.g. spillage kits) would be held on-site and all Site personnel would be trained in their use.

5.1.3 Storage of Materials

The CEMP(s) will set out detailed storage proposals however, examples of such measures include:

- Placing arisings and temporary stockpiles outside of the Flood Zone 3 flood extent and away from drainage systems and watercourses.
- Placing all refuelling and storage areas for fuel, oil and chemicals at least 10 m away from the top of the bank of watercourses;
- All storage areas will be covered where possible to prevent the accumulation of rainwater. Where coverage is not adequate in heavy rainfall, containment measures such as bunds may include a valve to release accumulated rainwater;
- Containment measures will be implemented, including drip trays, bunding or double-skinned tanks of fuels and oils. These will have a minimum capacity of 110% of the capacity of the containers;
- Where these containment measures, such as bunds, are stored on impermeable surfaces, an oil separator (interceptor), or other device to remove oil from water, may need to be installed. This will be detailed in the CEMP if required;
- All chemicals would be stored in accordance with their Control of Substances Hazardous to Health (COSHH) guidelines, whilst spill kits will be provided in areas of fuel/oil/minor chemicals storage.
- An emergency spillage plan will be produced, which Site staff will have read and confirmed that they understand, via the Site induction.

- The mixing and handling of materials would be undertaken in designated areas and away from surface water drains.
- Plant and machinery will be kept away from surface waterbodies wherever possible and would have drip trays installed beneath oil tanks/engines/gearboxes and hydraulics, which would be checked and emptied regularly. Refuelling and delivery areas would be located away from surface water drains.
- Exposed ground and stockpiles would be protected as appropriate and practicable to prevent windblown migration of potential contaminants. Water suppression would be used if there is a risk of fugitive dust emissions.

5.1.4 Concrete

The exact locations and method of installation of concrete works within the site are not confirmed at this stage however, this will be detailed in the CEMP post-consent. Mitigation will likely include:

- Managing the timing of concrete works to account for weather conditions, where practicable concrete pours will be minimised during heavy precipitation events and carried out during dry periods.
- Regarding runoff control, the topography and layout of the site will be considered to direct works away from drainage channels, surface water features and sensitive areas.
- Containment measures for concrete washout, such as bunds and lined washout pits, will be designed in to the site, and measures will also implemented during the construction phase. These may include drain covers, ground protection (such as plastic sheeting), and wheel-washing facilities for vehicles travelling to and from site. Operatives will be briefed on the environmental risks and correct washout procedures.

5.1.5 Discharge/Disposal of Site Runoff

Where practical, earthworks will be undertaken during the drier months of the year. When undertaking earth moving works periods of very wet weather will be avoided, where practical, to minimise the risk of generating runoff contaminated with fine particulates. However, it is likely that some working during wet weather periods will be unavoidable, in which case other mitigation measures will be implemented to control fine sediment laden runoff. Water may also be required to dampen earthworks during dry weather to reduce dust impacts, and any runoff generated will need to be appropriately managed by the contractor(s) in accordance with the pollution prevention principles described in this chapter.

To protect watercourses from fine sediment runoff, topsoil/subsoil will be stored a minimum of 20m from watercourses on flat lying land. Where this is not practicable, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth, or runoff prevented from draining to a watercourse without prior treatment.

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

Where needed, equipment and plant are to be washed out and cleaned in designated areas within the compound, where runoff can be isolated for treatment before disposal.

Mud deposits will be controlled at entry and exit points to the Site using wheel washing facilities and/or road sweepers operating during earthworks activities or as required.

Wash water will be prevented from passing untreated into watercourses. The exact measures to ensure this will be detailed in the CEMP post-consent however, vehicle wash out and wheel washing facilities will be sited a minimum of 10 m from top of bank of watercourses, and mitigation measures are likely to include:

- A designated impermeable or lined area.
- Sediment management measures such as silt fencing).
- Provision of SuDS features where possible, which will be selected appropriately to provide sufficient treatment for suspended solids, metals and hydrocarbons.

If road transport is required to remove wash water to an offsite disposal facility then this will be assessed in the waste management procedures, which will be detailed in the CEMP.

If any suspected contaminated material is discovered during the works, the contractor would be required to investigate the areas and assess the need for containment or disposal of the material. If material is considered to be contaminated, it will be disposed of to an appropriately licensed facility.

Foundations and services will be designed and constructed to prevent the creation of pathways for the migration of contaminants, and would be constructed of materials that are suitable for the ground conditions and designed use. The identification and evaluation of potential hazards associated with piling, along with appropriate control and mitigation measures, will be detailed within a Piling Risk Assessment. Any foundations required for the BESS and Substation areas would been designed such that they would not compromise the design or function of the surface water drainage proposals and impermeable lining.

5.1.6 Temporary Drainage

Measures that would be considered for implementation for temporary drainage through the construction design and/or CEMP(s) include:

- All reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in, and the pollution by sediment of, any existing watercourse, arising from construction activities. The measures will accord with the principles set out in industry guidelines. Measures may include use and maintenance of temporary lagoons, tanks, bunds and fabric silt fences or silt screens, as well as consideration of the type of plant used;
- A temporary drainage system will be developed to prevent runoff contaminated with fine particulates from entering surface water drains without treatment. This will include identifying all land drains and waterbodies in the Proposed Development area and ensuring that they are adequately protected using drain covers, sand bags, earth bunds, geotextile silt fences, straw bales, or proprietary treatment (e.g. lamella clarifiers);
- Connectivity will be maintained between the floodplain and the adjacent watercourses, with no increase in ground levels within the floodplain;
- Cut-off ditches or geotextile silt-fences, installed around excavations, exposed ground and stockpiles to prevent uncontrolled release of sediments; and
- Site access points would be regularly cleaned to prevent build-up of dust and mud; and all potentially contaminated waters (for example washdown areas, stockpiles and other areas of risk for water contamination) to have separate drainage. Any contaminated waters would be tankered away from the Site.

In addition, if monitoring demonstrates unsatisfactory levels of solids or other pollutants, measures would be implemented (e.g. changes to Site drainage and settlement facilities and/or use of flocculants), to control suspended solids or other contaminated discharge to watercourses.

5.1.7 Spillage Risk

Measures that would be considered for implementation for spillage risk through the Water Management Plan (WMP) and/or CEMP(s) are outlined below.

Fuel will be stored and used in accordance with the Control of Substances Hazardous to Health Regulations 2002, and the Control of Pollution (Oil Storage) (England) Regulations 2001. Particular care will be taken with the delivery and use of concrete and cement as it is highly corrosive and alkaline.

Fuel and other potentially polluting chemicals will either be in self-bunded leak proof containers or stored in a secure impermeable and bunded area (minimum capacity of 110% of the capacity of the containers).

Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off Site if possible, or only at designated areas within the Site compound. Only construction equipment and vehicles free of all oil/fuel leaks will be permitted on Site. Drip trays will be placed below static mechanical plant.

Refuelling, oiling, and greasing will take place above drip trays or on an impermeable surface which provides protection to underground strata and watercourses, and away from drains as far as reasonably practicable. Vehicles will not be left unattended during refuelling.

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

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

The Surface Water Drainage Strategy Plans will include details for pollution prevention and will be prepared and included alongside the CEMP(s). Spill kits and oil absorbent material will be carried by mobile plant and located at high-risk locations across the Order Limits and regularly topped up. All construction workers will receive spill response training and tool box talks.

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

Suitable facilities for concrete wash water (e.g. geotextile wrapped sealed skip, container or earth bunded area) will be adequately contained, prevented from entering any drain, and removed from the Site for appropriate disposal at a suitably licensed waste facility.

Water quality monitoring of potentially impacted watercourse will be undertaken to ensure that pollution events can be detected against baseline conditions and dealt with effectively. Details of the water quality monitoring regime (including monitoring intervals) will be set out within the CEMP post consent, but will likely include monitoring upstream and downstream of any proposed surface water outfalls and water crossings as a minimum.

5.1.8 Watercourse Cable Crossings

A pre-works hydromorphology survey will be carried out for each watercourse to ensure the correct depth for passing under the watercourse.

A hydrogeological risk assessment will be produced prior to detailed design which will include a site-specific hydraulic fracture risk assessment. This will be produced as part of the CEMP prior to commencing works to define the mitigation required based on ground conditions.

A tidal riverbed survey will be required prior to the works under the River Trent.

The launch and receiving pits will be a minimum of 16m from the top of bank.

The cable route crossing of the River Trent will be a minimum of 5m below the bed of the river. For other smaller watercourses, the crossing will be a minimum of 2.5m below the bed of the watercourse.

There is a small risk of drilling fluid break out from drilling to the watercourse if not appropriately mitigated for Site specific conditions. Also included in this CEMP will be a bentonite fluid breakout plan and an emergency spillage response procedure.

5.2 Construction Mitigation Conclusion

With the above measures implemented, it is concluded that the construction will not cause or contribute to deterioration of the existing watercourses or groundwater bodies or jeopardise their potential to achieve good status.

As set out, the **Outline Construction Environmental Management Plan [EN010159/APP/7.4.3]** will be updated at detailed design and a CEMP will be produced to ensure that all construction activities relating to the watercourses are assessed in further detail, and appropriate mitigation is put in place. This will be prepared in consultation with the EA.

Furthermore, the CEMP will be supported by a Water Management Plan (WMP), that will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction.

The WMP will include details of pre, during and post-construction water quality monitoring, details of this monitoring regime (including monitoring intervals) will likely include monitoring upstream and downstream of any proposed surface water outfalls and water crossings as a minimum. The WMP will include details for pollution prevention and response in the event of an incident. It is expected that variable depths to groundwater may be present across the Order Limits, hence construction works will be phased to limit the impacts to groundwater flows.

6 Decommissioning Mitigation

An **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6.3]** has been prepared in support of the application, and measures relating to mitigation of decommissioning activities are set out within this. A DEMP will be produced to ensure that all decommissioning activities relating to the watercourses are assessed in further detail, and appropriate mitigation is put in place. Those related to the watercourses and waterbodies are summarised below.

6.1 Decommissioning Mitigation Measures

From a watercourses and waterbodies perspective, the mitigation measures required for the decommissioning stage will follow the principles of those identified for the construction stage. A summary of which is provided below:

- Staff Awareness and Training – Training to be provided to ensure that construction staff are aware of the potential impact to water resources and procedures to be followed in the event of an accidental pollution event.
- Pollution Plans – Will be provided to detail how accidental pollution events should be dealt with.
- Storage of Materials – Detailed storage proposals will be set out with in the DEMP, however examples include those listed in Section 5.1.3.
- Concrete – Mitigation will likely include managing the timing of concreting to account for weather conditions, any potential runoff will be directed away from surface water features and sensitive areas, and containment measures for concrete washout will be embedded.
- Discharge / Disposal of Site Runoff – Where practical, earthworks will be undertaken during the drier months of the year to minimise the risk of generating runoff contaminated with fine particulates. Where work is required during wet weather, measures (in line with those set out in Section 5.1.5) will be implemented to control fine sediment laden runoff.
- Temporary Drainage – Temporary drainage will be provided to prevent the deposition of fine sediment or other material in, and the pollution by sediment of, any existing watercourse during decommissioning. The principle of the drainage strategy will follow that set out in Section 5.1.6.
- Spillage Risk – Fuel and other potentially polluting chemicals will be stored in accordance with the relevant regulations and will either be in self-bunded leak proof containers or stored in a secure impermeable and bunded area. Further spillage risk mitigation measures are outlined in Section 5.1.7.

6.2 Decommissioning Mitigation Conclusion

With the above measures implemented, it is concluded that the decommissioning will not cause or contribute to deterioration of the existing watercourses or groundwater bodies or jeopardise their potential to achieve good status.

As per the oCEMP, the **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6.3]** will be updated at detailed design and a DEMP will be produced to ensure that all decommissioning activities relating to the watercourses are assessed in further detail, and appropriate mitigation is put in place.

7 Conclusions

As part of the development proposals, any works to the existing watercourses are to be limited to surface water drainage outfalls, watercourse bridging for access, cable crossings and ecological habitat provision.

Embedded measures have been designed in to the Proposed Development to ensure that impacts to watercourses and waterbodies are mitigated against.

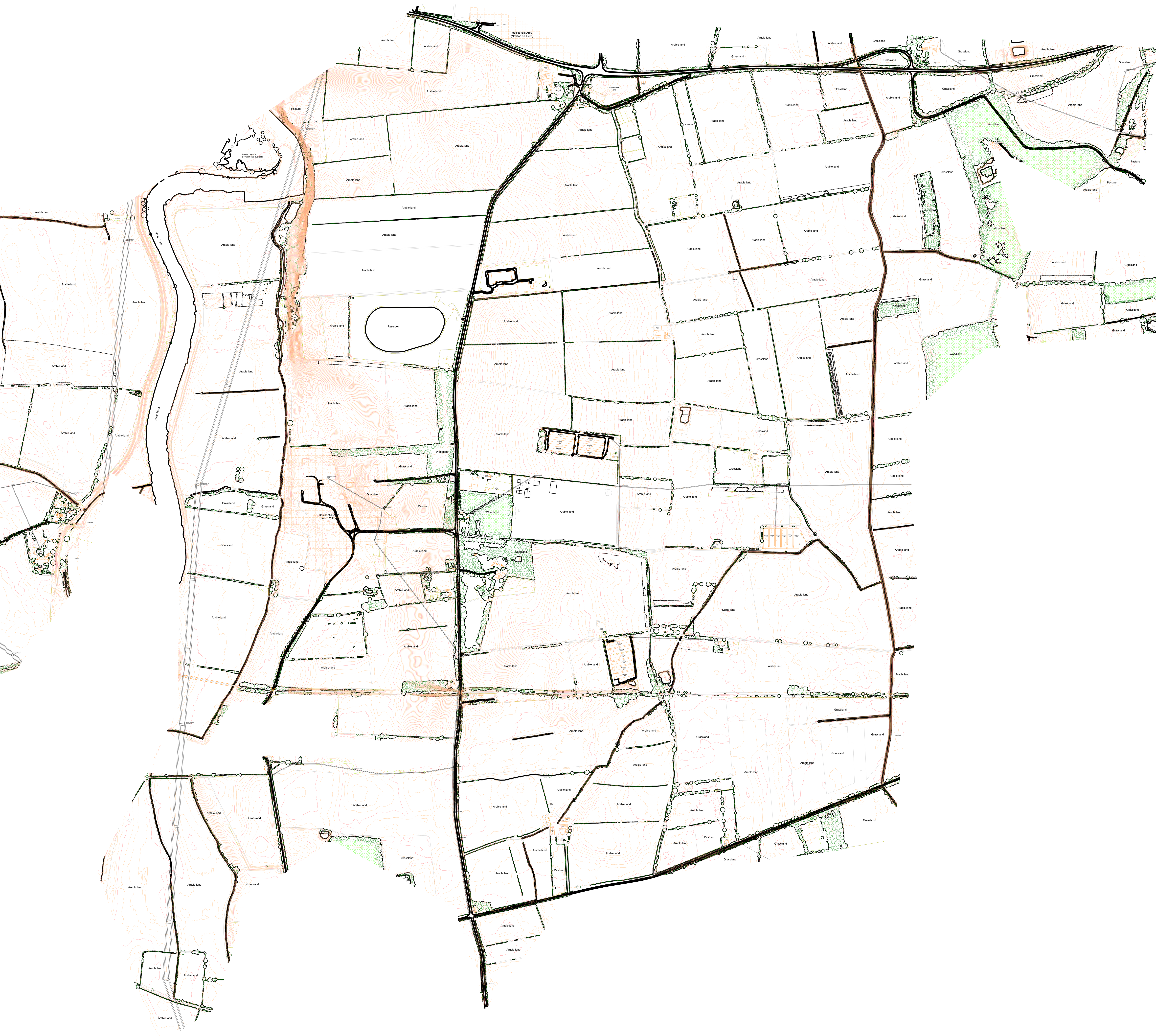
Construction mitigation measures have been set out within the **Outline Construction Environmental Management Plan [EN010159/APP/7.4]** and will be further considered within the CEMP at detailed design. The measures relating to watercourses and waterbodies are to ensure that potential impacts to these receptors are mitigated against.

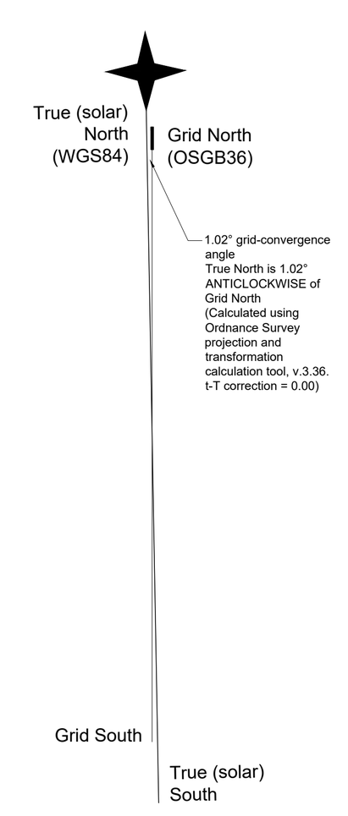
Taking into account the embedded measures and construction mitigation, it is concluded that neither the operational, construction or decommissioning stages of the development will cause or contribute to deterioration of the existing watercourses or groundwater bodies or jeopardise their potential to achieve good status.

Based on the above, it is proposed that no further consideration of WFD matters are required and all activities can be screened out.

8 Appendices

A1 Topographic Survey





SCALE OF MAIN DRAWING:
1:6000 when printed 100% on A0
Do not scale from this plot. All dimensions to be checked on-site.

LEGEND

- Tree canopy/hedgerow/foliage. Heights where given are to nearest meter.[1]
- Tree shapes for use in *PVcase*. **These do not represent exact tree locations**, but rather, entities which will be automatically recognised and converted to appropriate shading elements by *PVcase*. Areas of forest are therefore filled with trees of appropriate height. Height to nearest meter.[1]
- Water (dashed for apparent drainage feature or approx. path)
- Sealed road
- Unsealed track
- Power-line (or other overhead line) with utility post
- Fence, gate
- Railway track
- Public footpath/bridleway
- Apparent field boundary (As seen from aerial survey. NOT official boundary.)
- UAV mapping boundary (approx.)
- Building or other permanent structure
- Stone wall

ELEVATIONS

- Elevation of point above vertical datum (see 'COORDINATE REFERENCE SYSTEM AND DATUM' at bottom).[2]
- Contours (0.25 m) of digital surface model (dashed when over areas of obvious crop or vegetation).[3,4]

G.I.S. DATA

- 100m grid in OSGB36 map projection
- LAT. LONG. — The specific lines of latitude and longitude which pass through the site are marked in degrees, minutes, seconds (WGS84).
- NORTH — Grid North follows the direction of the North-South lines of the OSGB36 grid.
  True North follows lines of longitude, which converge on the axis of rotation of the Earth. True South points to the equator.
  The convergence angle (precision 2 d.p.) between Grid North and True North for this specific location is given.
  Magnetic North is not shown (but will be different again).

Third-party data

Site boundaries from client. Approx. public footpath routes from OS map.

NOTES

1. Heights of hedgerows and dense trees are marked alongside the foliage. All tree/hedge heights given are approximate heights above nearby ground, based on the Digital Surface Model.
2. It is important to note that this grid is from a Surface Model, not a Terrain Model, and therefore point-heights can only be interpreted as terrain when on areas of earth or hardstanding.
3. Likewise, the Contours are surface contours, not terrain contours, so should be interpreted carefully. Where contours are obviously not on earth or hardstanding, they are dashed.
4. Contours are generated from a subsampled (2.5m) terrain model to provide smooth but representative contour lines. Where contours cross trees, the path of the contour below the tree(s) is approximated.
5. Lat./long. lines are precisely calculated, but should be considered approximate because they represent a spherical coordinate system on a map projection. Locations and dimensions are accurate in the underlying map projection. But conversion of coordinates from the map projection to lat./long. (if required) should be performed using the appropriate transformation, not by inference from this plot.
6. Features hidden under dense vegetation (e.g. walls, fences) are only marked if visible from drone footage (or location otherwise provided or noted).

REVISIONS

1.0	22 Dec. 2023	Published to client [TAJC]

PROJECT
PS RENEWABLES - UAV SURFACE TOPOGRAPHY
Project One Earth in Nottinghamshire, U.K.

TITLE
ONE EARTH LINEWORK ("CAD") - EAST

DETAILS
2 Crossways Business Centre, Bicester Road,
Aylesbury HP18 0RA

above
Above Surveying Ltd.
Unit G Knowledge Gateway
Nesfield Road,
Colchester, CO4 3ZL, U.K.
T: +44 1206 483043
E: support@abovesurveying.com

LOCATION
Newark (53.2330, -0.7777)

COORDINATE SYSTEM AND DATUM
OSGB36, British National Grid Map Projection (EPSG: 27700). Units: meters
Elevations relative to sea level as height in meters above Ordnance Datum Newlyn (ODN) (EPSG: 5101). Geoid model, OSGM15.

SCALE OF MAIN DRAWING:
1:6000 when printed 100% on A0
Do not scale from this plot. All dimensions to be checked on-site.

LEGEND

- Tree canopy/hedgerow/foliage. Heights where given are to nearest meter.[1]
- Tree shapes for use in *PVcase*. **These do not represent exact tree locations**, but rather, entities which will be automatically recognised and converted to appropriate shading elements by *PVcase*. Areas of forest are therefore filled with trees of appropriate height. Height to nearest meter.[1]
- Water (dashed for apparent drainage feature or approx. path)
- Sealed road
- Unsealed track
- Power-line (or other overhead line) with utility post
- Fence, gate
- Railway track
- Public footpath/bridleway
- Apparent field boundary (As seen from aerial survey. NOT official boundary.)
- UAV mapping boundary (approx.)
- Building or other permanent structure
- Stone wall

ELEVATIONS

- Elevation of point above vertical datum (see 'COORDINATE REFERENCE SYSTEM AND DATUM' at bottom).[2]
- Contours (0.25 m) of digital surface model (dashed when over areas of obvious crop or vegetation).[3,4]

G.I.S. DATA

- 100m grid in OSGB36 map projection
- LAT. LONG. The specific lines of latitude and longitude which pass through the site are marked in degrees, minutes, seconds (WGS84).
- NORTH Grid North follows the direction of the North-South lines of the OSGB36 grid.
  True North follows lines of longitude, which converge on the axis of rotation of the Earth. True South points to the equator.
  The convergence angle (precision 2 d.p.) between Grid North and True North for this specific location is given.
  Magnetic North is not shown (but will be different again).

Third-party data

Site boundaries from client. Approx. public footpath routes from OS map.

NOTES

1. Heights of hedgerows and dense trees are marked alongside the foliage. All tree/hedge heights given are approximate heights above nearby ground, based on the Digital Surface Model.
2. It is important to note that this grid is from a Surface Model, not a Terrain Model, and therefore point-heights can only be interpreted as terrain when on areas of earth or hardstanding.
3. Likewise, the Contours are surface contours, not terrain contours, so should be interpreted carefully. Where contours are obviously not on earth or hardstanding, they are dashed.
4. Contours are generated from a subsampled (2.5m) terrain model to provide smooth but representative contour lines. Where contours cross trees, the path of the contour below the tree(s) is approximated.
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6. Features hidden under dense vegetation (e.g. walls, fences) are only marked if visible from drone footage (or location otherwise provided or noted).

REVISIONS

1.0	22 Dec. 2023	Published to client [TAJC]

PROJECT
PS RENEWABLES - UAV SURFACE TOPOGRAPHY
Project One Earth in Nottinghamshire, U.K.

TITLE
ONE EARTH LINEWORK ("CAD") - WEST

above
Above Surveying Ltd.
Unit G Knowledge Gateway
Nesfield Road,
Colchester, CO4 3ZL, U.K.
T: +44 1206 483043
E: support@abovesurveying.com

DETAILS
2 Crossways Business Centre, Bicester Road,
Aylesbury HP18 0RA

LOCATION
Newark (53.2330, -0.7777)

COORDINATE SYSTEM AND DATUM
OSGB36, British National Grid Map Projection (EPSG: 27700). Units: meters
Elevations relative to sea level as height in meters above Ordnance Datum Newlyn (ODN) (EPSG: 5101). Geoid model, OSGM15.

A2 Development Proposals

N

0 0.5 1km

one earth solar farm

Client:
One Earth Solar Farm Ltd

Drawing Title:
Illustrative Masterplan

Project:
One Earth Solar Farm

Document Reference Number:
EN010159/APP/2.9

Rev.
01

Drawn: JG | Designed: SG | Approved: SG

Planning Inspectorate Scheme Ref:EN010159

Drawing Date:
2025-01-06

Scale:
1:10000 @ A1

Volume 2

Legend

- Order Limits
- Existing hedgerows to be retained and enhanced
- Existing vegetation to be retained
- Proposed hedgrows
- Proposed standard trees
- Proposed woodland and tree belts
- Proposed tussock and grassland seed mix
- Proposed hedgerows with trees
- Proposed species-rich grassland seed mix
- Proposed hedgerows and field margin seed mix
- Proposed riparian zone seed mix
- Proposed solar PV Panels, power conversion stations and supporting infrastructure.
- Proposed location of substation and BESS
- Land for potential cable route
- Internal access tracks
- Proposed access points
- Existing PRoW
- Proposed permissive paths

A3 Environment Agency Meeting Minutes

Craig Thwaites

From: Cordell, James <James.Cordell@environment-agency.gov.uk>
Sent: 29 January 2025 10:01
To: Sophie Thorpe
Cc: Craig Thwaites; Sophie McCabe; Guido Pellizzaro; Gethins, Paul
Subject: RE: One Earth - Flood Model Queries

Good morning Sophine

Apologies for the delay, thank you for sending the draft minutes over from our flood risk meeting, I can confirm we are happy with these.

In relation to the WFD aspects, it is important that you are aware of the advice notes on WFD on the PINS website and follow a methodical, stepwise approach to both identify risk and demonstrate compliance with legislation.

The other elements to be mindful of are designated sites (both statutory and non-statutory) which may or may not be dependant of WFD waterbodies (but also need to be considered from a biodiversity perspective). Local Wildlife Sites (LWSs) are wildlife-rich sites selected for their local nature conservation value. They vary in shape and size and can contain important, distinctive, and threatened habitats and species. In many parts of the UK, they are the principal wildlife resource but their designation is non-statutory and their only protection comes via the planning system. Biodiversity Net Gain (BNG) is now mandatory, so this also needs to be factored.

Please see the bullet points below which highlight the stages for assessment in which you will need to follow:

- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive - GOV.UK – this summaries the WFD requirements
    - Stage 1 screening – illustrate all relevant WFD waterbodies (including groundwater) on a map / plan; identify zones of influence based on activities / characteristics of the project that could affect the identified waterbodies; and identify any specific activities / characteristics that could be screened out and why.
    - Stage 2 scoping – initial assessment to identify risks to receptors and whether more detailed impact assessment is needed.
    - Stage 3 impact assessment – detailed assessment of the waterbodies and activities following stages 1 & 2.
- England | Catchment Data Explorer – external water environment data (to assist with stage 1 screening and beyond).

Once you have completed the stage 1 screening, we can review the details you provide as part of a formal consultation, this will help assess whether stages 2 & 3 will be required.

I hope this advice is useful.

Kind Regards

James Cordell

National Infrastructure Team - Planning Advisor
Environment Agency | Ceres House, 2 Searby Road, Lincoln, LN2 4DW

Contact | Mob: 07585 888370 | www.gov.uk/environment-agency

One Earth Solar

Third Flood Risk Meeting with Environment Agency

Date:	26th September 2024	
Time:	14:30	
Location:	Virtual Teams Meeting	
Attendees:	Paul Gethins (PG) - Environment Agency	Harriet Swale (HS) – DWD Planning
	Sian Holland (SH) – Environment Agency	Ewan Sneddon (ES) - AECOM
	James Cordell (JC) – Environment Agency	Sophie McCabe (SM) - Logika
	Philip Sale (PS) - Environment Agency	Craig Thwaites (CT) - Logika
	Sam Griffiths (SG) – Iceni	Hasna Guanzari (HG) - Logika
	Matt Olney (MO) – Pershing Consultants	

Ref	Commentary	Action

1.0 Introductions

1.1 CT led introductions and indicated that the purpose of the meeting is predominantly to run through the flood risk/water comments that the Environment Agency (EA) provided in response to the Preliminary Environmental Impact Report (PEIR). CT indicated that the focus of the meeting is likely to be on the approach to freeboard allowances, hydraulic modelling requirements, and considerations of water quality.

2.0 Site and Masterplan Overview (SG)

2.1 SG provided an overview of the site and the indicative masterplan as it stands. In particular, SG highlighted where the proposed substations and BESS will be located.

3.0 Approach to Freeboards

3.1 CT indicated that in previous meetings with the EA, the approach to freeboard allowances was discussed and agreed. However for the purposes of attendees that were not in previous meetings, CT noted that it would be sensible to run through the approach.

3.2 CT shared a figure illustrating the flood extents and depths in the 1 in 100 year plus 39% climate change event (i.e. the design flood event) and

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Tel 020 3873 4783
Email accounts@logikaconsultants.co.uk
www.logikaconsultants.co.uk

indicated that it is this event that we are primarily looking to mitigate against when considering freeboards.

3.3 CT indicated that based on site constraints (including visual, engineering and archaeological), the maximum height the solar panels can be raised to is 1.8m (between the ground level and base of the panels).

3.4 With this in mind, CT shared a figure illustrating depths greater than 1.5m in the design flood event scenario (1 in 100 plus 39%) along with the illustrative solar layout and indicated that the aim is to steer development away from depths greater than 1.5m, meaning that a minimum freeboard of 300mm will be provided across the majority of the Site.

3.5 CT indicated that there are areas where this was not quite achievable and shared a figure (summary of freeboard allowances) to help understand where the 300mm freeboard was or was not achieved.

3.6 Referring to the figure, CT indicated that certain areas within the site will achieve more than 300mm freeboard, whilst smaller areas will still be above the flood level but will have a freeboard less than 300mm. It was noted that very limited areas would experience flooding at the base of the panels during the design flood event.

3.7 CT indicated that the freeboard approach remains acceptable from a design perspective and indicated that due to the slender nature of the frames, it is not considered that there would be a risk of obstruction and flows would still continue around the panels and frames should a blockage occur.

3.8 SH indicated that if a 300mm freeboard was previously agreed upon, then this can be taken forward. In the context of the PEIR responses, SH mentioned that the EA would require more detailed information on the areas at risk of flooding, their location, the freeboard provided, and the measures put in place to protect the solar panels. Additionally, SH emphasized the need to ensure that flood routes are not altered and that, if debris accumulates, a maintenance plan for its removal is established.

4.0 Land Raising

4.1 CT noted that there were comments in the PEIR regarding land raising and confirmed that there is no intention to raise ground levels across the site. CT also mentioned that the panels are already being raised, and a sequential approach has been taken for the placement of the proposed substations and BESS, generally in areas not prone to flooding. CT noted however, that there are some local areas where inverters will be required within the design flood extents but clarified that these will be raised above the flood levels with voided structures beneath, ensuring no loss of floodplain storage or impacts on flows.

4.2 SH indicated that the above was agreeable but recommended that the risk of debris or sediment accumulating around any stilts/raised foundations. Therefore, a strict maintenance plan should be implemented to prevent this. CT confirmed that would be the case and it will be addressed in the FRA, providing an indicative maintenance plan for the planning stage to establish the key principals of what will be expected. Logika

5.0 Modelling Queries

5.1 Potential Increase in Flood Risk

5.1.1 CT made reference to the EA's PEIR comments where the recommended relating to the use of roughness patches or flow constriction within modelling to consider the impact that the panel frames could have on flood flows. CT noted that the frames and any stilts/foundations (for inverters) will be slender and spaced out accordingly to ensure that any impacts on flows would be limited and therefore asked for clarity on the EA's requests.

5.1.2 PS indicated that the tidal Trent model is relatively coarse in its grid size and noted that it was unlikely that any modelling exercise would show negative impacts. With this in mind, PS suggested that another quantified method could be used to illustrate to the EA that the proposed panel frames would not have an impact on flood risk to the Site or surrounding area.

5.1.3 CT suggested that one method that could be reviewed was the quantification of the frame volumes within the design flood event and determine a potential increased flood depth as a result. PS confirmed that the method was reasonable and agreed that a depth of less than 5mm would be acceptable as a tolerance. Logika

[Post Meeting Note: Following a meeting with the EA held on the 11th September 2025, it was agreed that the 5mm tolerance should not be referred to as a "model tolerance" on the basis that this differs for each hydraulic model. The EA confirmed however, that the 5mm tolerance is still considered acceptable for the flood storage assessment and depth increases less than this are considered to have a negligible impact on flood risk]

5.2 Pluvial vs Fluvial Considerations

5.2.1 CT made reference to the PEIR response and the EA's suggestion that additional modelling may be required to confirm flood risk from ordinary watercourses at the Site, where these may be the dominant source of flood risk.

5.2.2 CT clarified with the EA that the watercourses in question were the Fledborough Beck to the west, an unnamed ordinary watercourse to the south west and a final ordinary watercourse to the east. With this in mind,

CT indicated that the watercourse to the east was entirely within the design flood extents from the River Trent and is the risk in this location is therefore associated with the River Trent. The EA were in agreement with both the watercourses in question and the dominance of the River Trent for the eastern areas.

5.2.3 CT referred back to the PEIR and noted that the original suggestion to use the medium risk surface water flood extents as a proxy for fluvial flood risk is unlikely to be a conservative estimate when also considering climate change. CT suggested therefore that the low risk flood extents and depths be used instead as this is a more conservative approach.

5.2.4 PS and SH agreed that this is a more conservative assessment but requested that some quantification is undertaken to confirm that the low risk pluvial event (between 1 in 100 year and 1 in 1,000 year probability of occurrence) is comparable to the design fluvial event.

5.2.5 CT and SM queried if there was a specific method that the EA would suggest following for this assessment. PS clarified that an assessment of flows within the catchments for the watercourses to the west would be sensible. Logika

5.2.6 Assuming that the results of the flow assessment indicate that the low risk pluvial extents are CT indicated that the panels would be raised above the pluvial flood depths, providing a 300mm freeboard wherever possible.

5.3 Breach

5.3.1 CT indicated that within previous meetings with the EA, it was set out and agreed that based on the breach modelling results from the Tidal Trent modelling, a breach at location 36 (north of the Site) was shown to result in the maximum flood extent at the Site.

5.3.2 With the above in mind, CT queried with the EA, what additional assessments they would like to see to provide confidence of impacts in a breach scenario.

5.3.3 PS and SH indicated that they would like to see consideration of how breaches in locations closer to the Site could impact the development and the BESS/sub-station areas in particular.

5.3.4 CT/SM queried whether there was any specific technique that the EA would like to see in order to assess this. PS clarified, this this did not need to include formal hydraulic modelling but could be an assessment using in channel nodes from the Tidal Trent model at locations closer to the Site.

5.3.5 CT/SM indicated that they would take this away and consider the best ways to represent this and will then present to the EA at a later date for consideration. Logika

6.0 Water Quality Considerations

6.1 CT noted that reference to water quality of the existing watercourses on site were made in the EA's PEIR responses. CT clarified that there will only be limited works to the watercourses and there would be no deterioration in status or any obstruction to them achieving good status in the future.

6.2 With the above in mind, CT queried whether there is a strict requirement for a full WFD assessment.

6.3 PG indicated that they would direct any specific questions on that matter to the water quality team, as there isn't anyone on the call who could provide insight. EA

6.4 CT indicated that they would include their questions and thoughts following the meeting. Logika

7.0 Any Other Business

7.1 CT indicated that the proposed development lies outside of flood zone 3b which is considered to be the functional floodplain by the EA and that the quality of the existing flood defences based on the inspection data is fairly in a good status.

7.2 CT also indicated that the maximum credible flood event has been assessed and provides similar results to the design flood event. CT noted that this will be summarised within the FRA.

Post Meeting Note

Following the meeting, a teams call was held between CT and PS on the 15.11.2024 to discuss the approach to modelling techniques and the outcomes of these. These discussions are summarised below:

Potential Increase in Flood Risk

- CT indicated that a high level assessment of the potential flood volume lost as a result of the solar panel frames has been undertaken and confirmed that a potential increase in flood depth of 0.09mm has been calculated which is well beneath the 5mm limit that the EA indicated previously.
- With regards to the above, CT clarified the following:
    - There are a total of approximately 1.5 million panels proposed within the Site boundary and to be conservative, it has been assumed that all panels would

sit within the floodplain. In reality however, many of the panels do not lay within the floodplain and would not contribute to floodplain losses.

- The assessment of flood storage lost considers a conservative maximum flood depth of 1.8m across all panels. It is worth noting however, that flood depths across many of the panels will be well below 1.8m.
- Using the above, the maximum flood volume that could be lost as a result of the solar panel frames is equivalent to 618m^3.
- The potential increase in flood depth is calculated by comparing the flood volume above (618m^3) to the maximum extent of flooding in the design flood event (of 688 hectares).

- PS indicated that the approach was agreeable (subject to sight of calculations within the FRA) but suggested that the flood flow directions should also be interrogated within the model to add weight to the assessment.

Pluvial vs Fluvial Considerations

- CT indicated that a ReFH2 assessment using FEH catchment descriptors has been undertaken for the Fledborough Beck and Orsinary Watercourse to the south west. CT noted that the assessment considered the 1 in 100 year plus 39% climate change total flow to represent the fluvial flood scenario and the 1 in 1,000 year direct runoff to represent the pluvial flood scenario.
- CT noted that the results of the assessment indicated that the direct runoff in the pluvial scenario are greater than the fluvial. With this in mind, CT concluded that using the low risk flood extents and depths as a proxy for the design fluvial flood event was appropriate and conservative.
- PS indicated that this approach was acceptable.

Breach

- CT indicated that the in channel defended flood levels for the design flood event have been reviewed as a proxy for the potential breach flood level and the maximum in the vicinity of the Site is shown to be 8.7m AOD.
- CT noted that a contour at 8.7m AOD has therefore been added to the development plans which indicates that only a small part of the western BESS/substation area could be impacted by this residual flood level. CT indicated that on the basis that this

is a residual event that this was considered acceptable from an operational perspective.

- CT noted that a breach flood level of 8.7m AOD would not reach the eastern BESS/substation areas due to high ground between the two areas.
- PS indicated that above assessment was considered to be appropriate and acceptable.

One Earth Solar

Fourth Flood Risk Meeting with Environment Agency

Date:	16th January 2025	
Time:	14:00	
Location:	Virtual Teams Meeting	
Attendees:	Paul Gethins (PG) - Environment Agency	Sophie McCabe (SM) - Logika
	Sian Holland (SH) – Environment Agency	Craig Thwaites (CT) - Logika
	James Cordell (JC) – Environment Agency	Sophie Thorpe (ST) - Logika
	Philip Sale (PS) - Environment Agency	

Ref	Commentary	Action

1.0 Introductions

1.1 CT led introductions and indicated that the purpose of the meeting was predominantly to run through our progress in relation to the outstanding flood risk / water comments previously provided by the Environment Agency (EA).

1.2 CT also drew attenuation to the pre-Christmas call with PS, from which actions were included in the post-meeting notes within the previous meeting minutes (14529-30-M03-01-F).

2.0 Floodplain Storage Loss

2.1 CT outlined the approach taken to assess floodplain storage loss associated with the panel supports, as requested by the EA. The volume assessment has been undertaken on a conservative basis, calculated using flood depths of up to 1.8m (although not all frames will be flooded to this depth), and across all areas where panels are proposed (not just those within the flood extent).

2.2 Results of the volume assessment indicate that the panels supports would displace approximately 620m^3 of floodwater, but that when compared to the design flood extent within the Site, the increase in flood depth that could be experienced is less than 1mm. CT confirmed this is well within 5mm tolerance as previously discussed with the EA. CT confirmed that this will all be outlined within the FRA, with further information on the calculations provided.

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[<u>Post Meeting Note:</u> Following a meeting with the EA held on the 11th September 2025, it was agreed that the 5mm tolerance should not be referred to as a "model tolerance" on the basis that this differs for each hydraulic model. The EA confirmed however, that the 5mm tolerance is still considered acceptable for the flood storage assessment and depth increases less than this are considered to have a negligible impact on flood risk]

2.3 SH confirmed that the calculations methodology and results were acceptable.

2.4 SM confirmed that in addition to the conservative approach outlined by CT, in reality the floodplain extends beyond the Site boundary. Meaning that any increase in flood depth is likely to be less than that calculated.

3.0 Pluvial / Fluvial Considerations

3.1 CT referred back to the EA comments raised previously in relation to the use of the surface water flood extents as a proxy for fluvial flood extents associated with the Fledborough Beck and Unnamed Ordinary Watercourse to the south.

3.2 CT outlined that analysis had since been undertaken in the form of a ReFH2 assessment for the 100 yr +CC and 1000 yr fluvial and pluvial events. Results indicated a positive correlation between fluvial and pluvial flows within both watercourses, with the 1000 yr event presenting the greater flow rates of the events analysed. As a result, the 1000 yr pluvial event has been used as a proxy for the fluvial 100 yr plus climate change event for the purposes of our assessment. CT concluded that the assessment has been set out within the FRA and that this hopefully gives confidence. The EA agreed to this approach.

4.0 Breach – Western BESS

4.1 CT outlined the EA comments provided within the PEIR with regards to investigating the impact of a breach within the site. CT summarised the analysis that has been undertaken for the western BESS compound, using the highest in channel flood level for the design event and comparing this with ground levels in the western BESS compound area (using LiDAR).

4.2 CT noted that although the parameters plan shows a parcel of land earmarked for the substation and BESS (the edges of which fall within the indicative breach extent), it is not necessary for the entire parcel to be utilised for development. With this in mind, CT shared a figure illustrating the potential BESS and substation layout (as discussed with the One Earth engineering team) and highlighted that no above ground infrastructure would be required within the breach extent.

4.3 SM noted that, due to spatial constraints, there will be a need to locate an attenuation basin within the breach floodplain. It was noted however, that this is considered acceptable on the basis that this is a residual event and therefore unlikely to occur.

4.4 SH confirmed that this was acceptable but indicated that the basins should be outside of the design flood event. SM confirmed this is the case.

4.5 CT confirmed that consultation with the LLFA is ongoing, with a meeting to discuss the surface water drainage proposals to be undertaken in due course.

5.0 Breach – Eastern BESS

5.1 CT stated that a significant area of high ground is located between the River Trent and eastern BESS compound and that flood defences along the eastern bank generally have a standard of protection (SoP) of 1 in 5 yrs, which would be overtopped during the design flood extent. With this in mind, CT noted that the approach taken to assess a breach on the west was not considered appropriate for the eastern BESS compound.

5.2 Based on a review of the flood defence data, the South Clifton Major Embankment provides a SoP of 1 in 100 years and CT noted therefore that a breach at this location and potential flows towards the BESS have been considered.

5.3 CT noted that the EA breach modelling has been assessed for this location (Breach 38) and the result of this have been compared against existing ground levels to establish potential flow routes towards the BESS compound.

5.4 CT acknowledged however that the EA's current breach modelling accounts for the 29% climate change scenario and not the 39% (which is the design climate change allowance). With this in mind, a comparison of the design flood level and modelled breach level at the South Clifton Major Embankment has been undertaken.

5.5 This comparison indicated similar flood levels (80mm greater in the design flood event) and this potential increase in flood level has therefore been applied to levels adjacent to the BESS compound. By comparing these potential breach flood levels to the existing ground levels within the BESS compound, it is concluded that the compound will remain dry even in the breach scenario.

5.6 PS stated that the approach was agreeable and conservative. Furthermore, he indicated that in reality once a breach occurred, flood waters would attenuate across the floodplain which would likely result in a lower flood level near the eastern BESS location.

6.0 Any Other Business

6.1 Maintenance Plan

6.1.1 CT raised a previous comment from SH on the inclusion of a maintenance plan to outline post-flood actions (debris removal, etc.). CT confirmed that this would be covered at high level within the Flood Risk Assessment (FRA).

6.2 Water Framework Directive (WFD) Assessment

6.2.1 CT queried the outstanding questions put to the EA relating to the requirement for a WFD Assessment. JC confirmed receipt of the questions and confirmed he was trying to find the best person to speak to.

6.2.2 CT and SM clarified that we had assumed to date that a WFD Assessment is not required given the significant buffers provided to the watercourses and limited works proposed to the watercourses. It was noted that the submission deadline is getting close and as a result we would appreciate clarity on this as soon as possible so that actions can be taken if required. JC noted he would aim to get a response by next week (w/c 20th January 2025). **JC**

6.3 Submission

6.3.1 CT opened for any other questions / requirements to be included as part of the submission. SH recommended that commentary on decision making within the FRA would be appreciated to illustrate how decisions have been reached.

6.3.2 SM added that it would be good to keep the dialogue open and welcomed the EA to contact us directly with any questions if needed.

6.3.3 JC asked that a heads up be provided if possible, for when reports will be submitted to allow for resourcing to be arranged. SM stated that mid to late February 2025 is the ambition for submission.

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