Tillbridge Solar

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PEI Report Volume II Appendix 10-1: Water Framework Directive (WFD) Screening

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1. Introduction

Background

1.1 AECOM Limited (AECOM) has been commissioned by Tillbridge Solar Ltd to undertake a Water Framework Directive (WFD) Screening Assessment for Tillbridge Solar (hereafter referred to as 'the Scheme').

1.2 This WFD Screening Assessment is being carried out as part of the PEI Report so that statutory bodies can be consulted on the need for, and scope of any further, more detailed stages of WFD assessment. WFD Screening had previously been conducted in July 2022 (and included as an appendix to the EIA Scoping Report) and so this document is an update of that assessment to include and take into account additional important information regarding the Scheme.

1.3 Although at the time of writing (November 2022), specific design details on the Scheme have not been finalised, there is sufficient information to carry out this Screening exercise. This is done to inform subsequent phases of the assessment alongside the EIA process.

1.4 The Scheme broadly comprises the activities listed below, that are considered in this assessment. Naturally however, re-assessment may be required as more information becomes available throughout the planning and design process.

- Development of approximately 1,400 hectare Principal Site, including solar panel areas, associated development and mitigation land.
- Development of an approximately 16km cable route for connection to National Grid Cottam Substation, hereafter referred to as 'the Cable Route Corridor'.

1.5 Within this appendix, the Principal Site and Cable Route Corridor are collectively referred to as 'the Site'.

The Site

1.6 The Site is located to the north west of Lincoln, Lincolnshire and covers eight WFD surface water bodies, potentially crossing approximately 20 watercourses of which eight are WFD-monitored and two are statutory Main Rivers.

1.7 The eight water bodies are divided equally across two River Basin Districts (RBDs) – Anglian and Humber; two Management Catchments - (Lower Trent and Erewash and Witham); and two Operational Catchments (Trent and Tributaries and Upper Witham). The WFD water bodies are provided in Table 1-1.

1.8 The Site and WFD surface water bodies and ground water bodies are shown in **PEI Report Volume III Figure 10-1** and **Figure 10-2** respectively.

Table 1-1: WFD, RBD, Management and Operational Catchments, and Water Bodies

RBD	Management Catchment	Operational Catchment	Water body
Anglian	Witham	Upper Witham	Fillingham Beck - GB105030062490
			Skellingthorpe Main Drain - GB105030062390
			Till (Witham) – GB105030062500
			Tributary of Till - GB105030062480
Humber	Trent Lower and Erewash	Trent and tributaries	Eau from Source to Northorpe Beck - GB104028057970
			Marton Drain Catchment (trib of Trent) - GB104028057840
			Seymour Drain Catchment (trib of Trent) - GB104028058340
			Trent from Carlton-on-Trent to Laughton Drain – GB104028058480

Introduction to the Water Framework Directive

1.9 The Water Environment (WFD) (England and Wales) Regulations 2017, commonly referred to as the WFD, aims to protect and enhance the water environment.

1.10 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 classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

1.11 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 at the date of this assessment are the 2019 Cycle 3 plans.

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

1.13 The Environment Agency is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are responsible for consenting certain activities on Ordinary Watercourses. Local planning authorities are responsible for highways drains, and landowners are responsible for ditches and watercourses and also piped watercourses and culverts. While the Environment Agency is ultimately responsible for the WFD on

any water body, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

1.14 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:

- Cause a deterioration of any quality element of a water body from its current status or potential; and / or
- Prevent future attainment of good status or potential where not already achieved.

1.15 Regulation 17 of the Water Environment Regulations 2017 (i.e. the WFD) states that, like other public bodies, local authorities have a statutory duty to "have regard to the River Basin Management Plan" and "any supplementary plans" covering proposed activities when exercising its functions. Local authorities must therefore reflect water body improvement priorities as outlined in RBMPs.

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

2. Methodology

2.1 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.

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

- Environment Agency (Ref. 2-1). Water Framework Directive risk assessment. How to assess the risk of your activity.
- Environment Agency (Ref. 2-2). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers.
- The Planning Inspectorate (Ref. 2-3). Advice Note eighteen: The Water Framework Directive.

2.3 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 (Ref 2-3) and briefly summarised below. For this exercise, only Stage 1 (Screening) is presented.

Stage 1: Screening

2.4 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

2.5 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

2.6 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order 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.

Mitigation commitments

2.7 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 Orders, or other legally binding methods.

Regulation 19 Derogation

2.8 Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided, additional assessment is needed in the context of WFD Regulation 19 which covers procedures for WFD derogation.

2.9 Regulation 19 is a 'last resort' planning and legal process, and it is a matter for the Secretary of State to consider whether derogation under Regulation 19 is justified. An applicant would be required to provide detailed and often complex evidence to justify its case that the following four stringent tests have been met:

- Test (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned.
- Test (b): the reasons for modifications or alterations are specifically set out and explained in the RBMP.
- Test (c)(1): There is an overriding public interest in the Scheme and/or Test (c)(2): its benefits outweigh the benefits of the WFD objectives (i.e. that the benefits of the project to human health, human safety or sustainable development outweigh the benefits of achieving the WFD objectives).
- Test (d): The benefits of the project cannot be achieved by a significantly better environmental option (that are technically feasible and do not lead to disproportionate cost).

2.10 In addition, the Development must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other environmental legislation. In applying Regulation 19, steps must also be taken to make sure that the new provisions guarantee at least the same level of protection as the existing legislation.

Desk study

2.11 A high-level desk-based study was carried out to capture information pertaining the Scheme. Reviewal of relevant information relating to the study area was undertaken to begin to develop a baseline for WFD catchments, watercourses, and surrounding areas. The following data sources were used for the desk study:

- Environment Agency WFD data (Ref. 2-4);
- Ordnance Survey maps (Ref. 2-5);
- Historical maps (Ref. 2-6);
- Geology and soil data (Ref. 2-7);
- Natural environment maps and designations on the MAGIC website (Ref. 2-8 and

- Hydrological information (Ref. 2-9).

Limitations and assumptions

2.12 At the time of writing (November 2022) preliminary information was available about the Scheme and the specific activities required to facilitate its construction. Therefore, assumptions have been made based on experience of other solar developments and professional judgement and are stated in the text throughout. In addition, no site surveys have been conducted to support this assessment; instead, information has been gathered during a desk study exercise which have informed the assessment. However, it is considered that sufficient baseline information has been gathered from the desk study to enable an initial assessment to be undertaken.

3. Baseline Desk Study

Catchment characteristics

3.2 The eight identified WFD water bodies broadly share the same, or very similar, characteristics; therefore, for expediency, a broad description of their Operational Catchment is provided below.

General characteristics

Upper Witham

3.3 The Upper Witham catchment has a maximum elevation of around 157 m AOD and drains broadly south to north, before turning sharply east towards its confluence with The Haven, near Boston, Lincolnshire. However, the Scheme is located in the northern portion of the catchment which is drained by the River Till and tributaries: this flow broadly north to south. The catchment is heavily influenced by a significant proportion of arable farmland and improved grassland that, in combination, comprises more than 80% of its area. This strong agricultural influence has resulted in an extremely modified surface water drainage network, with straightened and probably grossly over-deepened channels forming the typical plan-form of water courses. A complex system of artificial drains and navigable waterways further exacerbate the low-functionality of the catchments hydrological network.

Trent and Tributaries

3.4 The Trent and Tributaries water body is a sizeable catchment with a maximum elevation of around 90 m AOD and drains broadly south to north, eventually joining the River Humber east of Goole, East Riding of Yorkshire. The Scheme occupies a small portion of the catchment, most of which is comprised of the proposed Cable Route Corridor. Similarly, the catchment is heavily dominated by agricultural land which influences the character and planform of the surface water network therein. Moreover, the main River Trent is designated as ‘Artificial’ under the WFD due to extensive modification required to maintain it as a navigable waterway.

Catchment Geology and Soils

Upper Witham

3.5 Superficial geology within the Upper Witham Operational catchment is dominated by alluvial deposits that are bordered by older river terrace deposits that define the lateral boundary of formally actively meandering river systems. Bedrock geology is comprised of Triassic sedimentary mudstones, siltstones and sandstones belonging to the Lias Group (BGS, 2022); while soils are comprised of shallow, lime-rich soils to the east of the catchment and a higher proportion of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils to the east (Ref. 3-1).

Trent and Tributaries

3.6 Superficial geology in the Trent and Tributaries Operation Catchment is similarly comprises deposits of alluvium bordered by older river terrace deposits, with aeolian sand deposits and glacial till comprising the remainder of the catchment area. Bedrock geology is dominated by Triassic sandstone, mudstones and

siltstones (BGS, 2022) while soil is dominated by slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Cranfield University, 2022).

Catchment Hydrology

Upper Witham

3.7 The Upper Within Catchment has poor coverage of readily available hydrology data with just one National River Flow Archive gauge situated in the uppermost region of the catchment: no data are available for the screened-in WFD water bodies. Annual average rainfall for the region of the catchment upstream of 30001 - Witham at Claypole Mill[1] is 632 mm and 615 mm for the periods 1941-1970 and 1961-1990 respectively. River flow is reflective of the catchment's fairly small (297 km^2) area, with mean flow of 1.9 m^3/s, baseflow (Q95) of 0.4 m^3/s and peak flow of 38 m^3/s.

Trent and Tributaries

3.8 The Trent and Tributaries catchment similarly has poor coverage of readily available hydrology data, with just one National River Flow Archive gauge situated in the uppermost region of the catchment: no data are available for the screened-in WFD water bodies. Nevertheless, annual average rainfall for the portion of the catchment upstream of the 28022 - Trent at North Muskham[2] is 756 mm and 747 mm for the periods 1941-1970 and 1961-1990 respectively. River flow is reflective of the sizeable (8231 km^2) catchment area upstream of the gauge, with mean flow of 90 m^3/s, baseflow (Q95) of 29 m^3/s and peak flow of over 1000 m^3/s.

Historical Channel Change

Upper Witham

3.9 Analysis of the historical mapping record (Ref. 2-6) reveals very little channel change over long-term and more recent timeframes respectively. This is because modifications to watercourses and excavation of land drains for agriculture took place many centuries before the emergence of formal mapping. However, given the topographic character of the catchment, and its generally low-lying elevation, its pre-modified state probably resembled a system of extensive wetland and bog habitats with strong lateral connectivity to the Witham and its tributaries, and vertical connectivity with underlying groundwater.

Trent and Tributaries

3.10 As with the neighbouring Upper Witham catchment, historical mapping reveals very little channel change due to modifications pre-dating formal OS mapping in the 19th Century. The Trent has a well-developed by extremely dysfunctional and poorly connected floodplain that once occupied a complex network of riparian wetlands and floodplain bog. This has been lost due to extensive land drainage, giving rise to the straightened and probably over-deepened surface water arrangement that comprises its contemporary drainage network.

WFD Status

3.11 The most recent (2019) WFD status of the eight screened-in surface water bodies and ground water bodies are provided in Table 3-1 and Table 3-2.

[1] https://nrfa.ceh.ac.uk/data/station/info/30001 - Accessed July 2022.
[2] https://nrfa.ceh.ac.uk/data/station/info/28022 - Accessed July 2022

Table 3-1: Summary of current Cycle 3 WFD status of the screened-in water bodies

Water body name	Fillingham Beck	Skellingthorpe Main Drain	River Till (Whitam)	Tributary of Till	Eau from Source to Northorpe Beck	Marton Drain Catchment (trib of Trent)	Seymour Drain Catchment (trib of Trent)	Trent from Carlton-on-Trent to Laughton Drain
Management Catchment	**Anglian**	**Anglian**	**Anglian**	**Anglian**	**Humber**	**Humber**	**Humber**	**Humber**
Water body ID	**GB105030062490**	**GB105030062390**	**GB105030062411**	**GB105030062480**	**GB104028057970**	**GB104028057840**	**GB104028058340**	**GB104028058480**
Hydromorphological designation	**heavily modified**	**heavily modified**	**heavily modified**	**not designated artificial or heavily modified**	**not designated artificial or heavily modified**	**heavily modified**	**heavily modified**	**Artificial**
Catchment area (km^2)	**24.33**	**98.27**	**86.03**	**17.14**	**49.54**	**5.04**	**19.60**	**153.22**
Length (km)	**2.46**	**10.22**	**25.09**	**4.91**	**17.07**	**3.15**	**6.48**	**58.55**
Ecological	**Moderate**	**Moderate**	**Moderate**	**Poor**	**Moderate**	**Moderate**	**Moderate**	**Moderate**
Biological quality elements	**Bad**	**Moderate**	**Moderate**	**Poor**	**Moderate**	**Good**	**Moderate**	**Bad**
Invertebrates	*Bad*	*Moderate*	*Good*	*Moderate*	*Good*	*Good*	*Moderate*	*Bad*
Macrophytes and Phytobenthos Combined	*Moderate (macrophytes only)*	*Poor (macrophytes only)*	*Poor (macrophytes only)*	*Poor*	*Moderate*	*Good (macrophytes only)*	*Moderate (macrophytes only)*	*Good*
Physico-chemical quality elements	**Moderate**	**Moderate**	**Moderate**	**High**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Water body name	Fillingham Beck	Skellingthorpe Main Drain	River Till (Whitam)	Tributary of Till	Eau from Source to Northorpe Beck	Marton Drain Catchment (trib of Trent)	Seymour Drain Catchment (trib of Trent)	Trent from Carlton-on-Trent to Laughton Drain
Ammonia (Phys-Chem)	*High*	*High*	*High*	*High*	*Good*	*High*	*High*	*High*
Dissolved oxygen	*High*	*Bad*	*Poor*	*High*	*High*	*Moderate*	*Poor*	*High*
Phosphate	*Moderate*	*High*	*Poor*	*High*	*Poor*	*Good*	*Poor*	*Poor*
Temperature	*High*	*High*	*High*	*High*	*High*	*High*	*High*	*High*
pH	*High*	*High*	*High*	*High*	*High*	*High*	*High*	*High*
Hydromorphological Supporting Elements	**Supports good**	**Supports good**	**Supports good**	**Supports good**	**Supports good**	**Supports good**	**Supports good**	**Supports good**
Hydrological Regime	*Supports good*	*Supports good*	*Supports good*	*High*	*High*	*Supports good*	*Supports good*	*Supports good*
Chemical	**Fail**	**Fail**	**Fail**	**Fail**	**Fail**	**Fail**	**Fail**	**Fail**
Priority hazardous substances	*Fail*	*Fail*	*Fail*	*Fail*	*Fail*	*Fail*	*Fail*	*Fail*
Priority substances	*Good*	*Good*	*Good*	*Good*	*Good*	*Good*	*Fail*	*Good*
Other Pollutants	*Does not require assessment*	*Does not require assessment*	*Does not require assessment*	*Does not require assessment*	*Does not require assessment*	*Does not require assessment*	*Does not require assessment*	*Good*

Note: Items in italics are sub-categories of the bolded items.

Table 3-2: Summary of current Cycle 3 WFD status of the screened-in groundwater bodies

Summary/Status	Witham Lias	Lower Trent Erewash – Secondary Combined
Water body ID	**GB40502G401400**	**GB40402G990300**
Hydromorphological designation	**Good**	**Good**
Surface area	**Good**	**Good**
Overall Water Body	**Good**	**Good**
Quantitative	**Good**	**Good**
Quantitative Status element	*Good*	*Good*
Quantitative Dependent Surface Water Body Status	*Good*	*Good*
Quantitative GWDTEs test	*Good*	*Good*
Quantitative Saline Intrusion	*Good*	*Good*
Quantitative Water Balance	*Good*	*Good*
Chemical (GW)	**Good**	**Good**
Chemical Status element	*Good*	*Good*
Chemical Dependent Surface Water Body Status	*Good*	*Good*
Chemical Drinking Water Protected Area	*Good*	*Good*
Chemical GWDTEs test	*Good*	*Good*
Chemical Saline Intrusion	*Good*	*Good*
General Chemical Test	*Good*	*Good*
Supporting elements (Groundwater)		
Prevent and Limit Objective	*Active*	*Active*
Trend Assessment	*No trend*	*No trend*

Note: Items in italics are sub-categories of the bolded items.

4. WFD Screening

4.1 The purpose of the WFD screening stage is to identify a zone of influence of the Scheme and to determine whether that influence has the potential to adversely impact upon WFD water body receptors. The screening stage also identifies specific activities of the Scheme that could affect receptor water bodies' WFD status and carries them forward to subsequent stages of the assessment process. Water body receptors that are screened out are not carried forward, and justification is provided. Certain activities on or near waterbodies are considered to be low risk by the EA, as summarised in Table 4-1. If the project or components of the project meet the criteria in Table 4-1 they may be screened out of any further assessment.

Table 4-1: WFD Low-Risk Activities (After Environment Agency (Ref. 2-2))

Activity	Type of Modification
Low impact maintenance activities (encourage removal of obstructions to fish/eel passage)	Re-pointing (block work structures)
	Void filling ('solid' structures)
	Re-positioning (rock or rubble or block work structures)
	Replacing elements (not whole structure)
	Re-facing
	Skimming/ covering/ grit blasting
	Cleaning and/or painting of a structure
Temporary works	Temporary scaffolding to enable bridge re-pointing
	Temporary clear span bridge with abutments set-back from bank top
	Temporary coffer dam (if eel/ fish passage not impeded)
	Temporary flow diversion (if fish/ eel passage not impeded) such as flumes and porta-dams
	Repair works to bridge or culvert which do not extend the structure, reduce the cross-section of the river or affect the banks or bed of the river, or reduce conveyance
	Excavation of trial pits of boreholes in byelaw margin
	Structural investigation works of a bridge/ culvert/ flood defence such as intrusive tests, non-intrusive surveys
Bridges	Permanent clear span bridge, with abutments set-back from bank top
	Bridge deck/ parapet replacement/ repair works
	Replacing road surface on a bridge
Service crossing	Service crossing below the river bed, installed by directional drilling or micro tunnelling if more than 1.5 m below the natural bed line of the river

	Service crossing over a river. This includes those attached to the parapets of a bridge or encapsulated within the bridge's footpath or road
	Replacement, installation or dismantling of service crossing/ high voltage cable over a river
Other structures	Fishing platforms
	Fish/ eel pass on existing structure (where <2% water body length is impacted)
	Cattle drinks
	Mink rafts
	Fencing (if open panel/ chicken wire) in byelaw margin

Screening of WFD surface water bodies

4.2 The Scheme interacts with a number of WFD surface water bodies. WFD Screening of these water bodies is provided in Table 4-2.

Table 4-2: Screening of WFD surface water bodies potentially impacted by the Scheme

Water Body ID	Screening Outcome	Justification
Fillingham Beck (GB105030062490)	**In**	The footprint of the Scheme interacts with these water bodies. Thus, there is a risk to WFD quality elements and the ecological and chemical status of each receptor water body. Therefore, these water bodies are screened in for further assessment. However, this is based on a precautionary assessment due to limitations on available Scheme information. It is possible that once further Scheme information is known this initial screening decision could be altered. Thus, due to a lack of specific information on engineering activities associated with the Scheme, it assumed that watercourses would be crossed using intrusive techniques; however, if the final proposed method of watercourse crossing is non-intrusive, i.e., subterranean cables routed well below watercourse hard beds, then these would likely be screened out. It is planned that larger watercourses such as the River Trent will be crossed using non-intrusive techniques, yet it is possible that tributaries within the waterbody will also be crossed by the cable and so this water body remains screened-in.
Skellingthorpe Main Drain (GB105030062390)	**In**	
Till (Witham) (GB105030062500)	**In**	
Tributary of Till (GB105030062480)	**In**	
Eau from Source to Northorpe Beck (GB104028057970)	**In**	
Marton Drain Catchment (trib of Trent) (GB104028057840)	**In**	
Seymour Drain Catchment (trib of Trent) (GB104028058340)	**In**	
Trent from Carlton-on-Trent to Laughton Drain (GB104028058480)	**In**	

Screening of WFD groundwater bodies

4.3 The Scheme interacts with a number of WFD groundwater bodies. WFD Screening of these water bodies is provided in Table 4-3.

Table 4-3: Screening of WFD groundwater bodies potentially impacted by the Scheme

Water Body ID	Screening Outcome	Justification
Witham Lias (GB40502G401400)	**In**	The WFD ground water bodies underlay the Scheme and therefore may be impacted depending on the depth of foundations/excavations and thickness of overlying superficial deposits. Therefore, these water bodies are screened in for further assessment. However, this is based on a precautionary assessment due to limitations on available scheme information. It is possible that once further scheme information is known this initial screening decision could be altered.
Lower Trent Erewash - Secondary Combined (GB40402G990300)	**In**	
Blisworth Limestone Rutland formation (GB40401G444500)	Out	These WFD ground water bodies would not interact with the Scheme due to being situated outside of the Scheme Boundary and are likely to be hydrologically disconnected from any anticipated impact. Therefore, these water bodies are screened out of any further assessment.
Grimsby Ancholme Louth Limestone Unit (GB40401G444600)	Out	
Cornbrash (Humber) (GB40402G444700)	Out	
Cornbrash (Anglian) (GB40502G445000)	Out	
Witham Limestone Unit A (GB40501G444800)	Out	
Blisworth Limestone Rutland formation (GB40501G444900)	Out	

Screening of Activities

4.4 The Scheme comprises a number of activities that present a potential risk to the WFD status of the water body identified in the previous section. The screening assessment of activities pertaining to the Scheme is provided in Table 4-4. At this point, it should be noted that detailed design for the Scheme has not been confirmed, and so a re-evaluation of some activities may be required at a later date, as laid out in detail in the Limitations and Assumptions

sub-section of this report. Some activities listed in this table have as yet not been confirmed as being present, but it is assumed they will be required based on previous assessments of similar schemes. If any of these activities are subsequently found not be part of the Scheme, then they will be withdrawn from subsequent stages of assessment. Likewise, there may be some Scheme components that have not been anticipated and so will be added at subsequent stages of assessment.

Table 4-4: Screening of the Scheme's activities

Activity	Description	Screening Outcome	Justification
Solar PV Panels and PV Mounting Structures which combine to form PV tables	Solar PV panels will clear the ground by no less than 0.6 m as they will be mounted on PV Mounting Structures. This will avoid the creation of an impermeable surface on the ground or the need for extensive earthworks. The mounting poles are likely to be driven or screwed into the ground, which would remove the need for concrete footings or beds and so likewise avoid the creation of an impermeable surface. Proposed design details indicate that the Principal Site will overlay watercourses, and so in these locations a 10 m buffer should be committed to.	In	There should be no direct hydromorphological impacts to watercourses if the 10 m buffer from watercourses is maintained, and the use of mounting poles would be of benefit to drainage conditions. This element will need further assessment however once design details have been defined to a greater level of clarity and so this activity is screened in for this stage of assessment.
Solar Stations (for transformers, switchgear, and metering equipment)	The Solar Stations will likely comprise of inverters, transformers, and switchgear. It is envisaged that there will be between 130-140 Solar Stations in total, though this will not be confirmed until a later design stage.	In	Infrastructure should not be located within close proximity of a watercourse and so there is no mechanism for direct hydromorphological impacts to surface water bodies. Providing this guidance is followed, there need not be any adverse impacts on WFD status of any quality element, though this will need further assessment at a later stage once design details have been confirmed.
Battery Energy Storage Systems (BESS) Compound(s)	The exact locations of the BESS, transformers, and dedicated switchgear are yet to be determined but it is anticipated that the BESS is DC-coupled. This means they will be spread across the site and located alongside the solar stations prioritising the cable length to minimise losses. The footprint for each battery energy storage container would be around 12.2 m in length x 2.5 m in width x 4 m in height.	In	Infrastructure should not be located within close proximity of a watercourse and so there is no mechanism for direct hydromorphological impacts to surface water bodies. Providing this guidance is followed, there need not be any adverse impacts on WFD status of any quality element, though this will need further assessment at a later stage once design details have been confirmed.
On-Site Cabling	Cabling will be required between PV modules and inverters, and between transformers and the on-site substation. For the former, 1.5kV cables will likely be	In	Indicative trench depths of the On-Site cabling of 1.2 m mean there should be negligible to no impacts on the WFD groundwater bodies, though this will be

Activity	Description	Screening Outcome	Justification
	required, with cabling between PV modules and inverters above ground (fixed to mounting structure) and underground (between racks and in the inverter's input). The dimensions of any trenches will vary depending on the number of ducts but could typically be around 4 m in width and around 1.2 m in depth. For cabling between transformers and the on-site substation would require higher rated cables (likely 33 kV) and trenches around 5 m wide and 2 m deep, and in some areas precast concrete troughs may be required.		confirmed once design details have been confirmed and following a more in-depth of groundwater levels. It is possible that cabling will need to cross watercourses and so this will need further assessment if this is the case. Ideally, non-intrusive techniques such as Horizontal Directional Drilling (HDD) should be used for any watercourse crossings so as to avoid non-compliance with WFD legislation.
Foul drainage	At this point there is no information regarding the treatment and management of either wastewater or foul drainage, but it is assumed that there would only be low volumes of foul drainage generated which will be self-contained in independent non-mains domestic storage and / or a treatment system. These would be regularly emptied under contract with a registered recycling and waste management contractor. Should other options be pursued, such as connection to a foul sewer or the direct discharge of treated effluent to a watercourse, this would require further and more detailed assessment.	In	If foul drainage is confirmed to be dealt with in independent non-mains domestic storage and/or treatment system then this activity would be screened out, but until this is confirmed, it must be screened in for this stage of assessment.
Drainage design	The detailed operational drainage design will be carried out pre-construction. This design should aim to ensure that drainage of the land to the present level is maintained. It should follow either the design of a new drainage system taking into account the proposed new infrastructure (access tracks, cable trenches, structure foundations) to be constructed, or, if during the construction of any of the infrastructure, there is any interruption to existing schemes of land drainage, then new sections of drainage will be constructed.	In	Until there is a confirmed detailed design that demonstrates that the recommendations outlined in the activity description will be followed, this activity must be screened in for this stage of assessment.

Activity	Description	Screening Outcome	Justification
Grid connection and Cable Route Corridor	To connect the Principal Site to Cottam National Grid Substation, 400kV cables would be installed. The total length of the cable run within the cable route corridor is approximately 16 km. A further 400kV underground cable circuit approximately 8 km long will be required within the Principal Site to interconnect the two 400kV/33kV substations. The cables will be installed within a trenched corridor, thought to be approximately 800 mm to 1 m wide by 1.7 m deep. It is also likely that jointing pits will be required every 800 m to 1000 m to join sections of cable together. The dimensions of the jointing pit would be around 19 m in length x 3 m in width x 2.5 m in depth. A link box pit of around 2 m in length x 2 m in width would also be required. At locations where the cable crosses watercourses, it is assumed as a worst-case scenario that intrusive techniques will be used to cross the smaller watercourses, with non-intrusive techniques such as HDD used to cross larger watercourses.	In	The precise Cable Route Corridor has not been defined, nor have crossing techniques been finalised and so this activity must be screened in at this stage of assessment. From a WFD perspective, non-intrusive techniques such as HDD would be much preferred compared to intrusive, open-cut techniques, and if this practice is committed to then there would likely be no issues with WFD compliance. The use of intrusive crossing techniques may lead to issues with WFD compliance at future stages of assessment depending upon the sensitivity of the watercourses.
Fire management	Fire management is likely to be implanted through installation of water tanks situated across the site. Fire water containment would need to be capable of capturing 228,000 litres, plus an acceptable additional capacity.	In	Until there is a confirmed detailed design that demonstrates WFD compliance, this activity must be screened in for this stage of assessment.
Access tracks	It is assumed access tracks will be needed across both the Principal Site and the Cable Route Corridor. The internal road layout should be designed so as to avoid drainage ditch and watercourse crossings where possible. Access tracks should be permeable, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control runoff. As a design principle, the creation of new culverts should be entirely avoided, as this will place the Scheme at very	In	Until there is a confirmed detailed design that demonstrates that the recommendations outlined in the activity description will be followed, this activity must be screened in for this stage of assessment.

Activity	Description	Screening Outcome	Justification
	high risk of being non-WFD compliant. Where the crossing of watercourses is required, an open span bridge should instead be used with the abutments set back from the top of the bank surrounding the watercourse and use non-intrusive pad foundations.		
Surface water outfalls	There are no design details regarding surface water outfalls, but it is assumed that the Scheme will require new surface water outfalls to watercourses for drainage purposes, which will require review at the ES stage. The location, position, and orientation of any proposed surface water outfalls should be carefully determined and informed by a hydromorphology 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 to that effect it is not proposed that outfalls are recessed into the bank. From a WFD perspective, it would also be advisable to use green, soft ditch connections rather than direct outfalls.	In	Until there is a confirmed detailed design that demonstrates that the recommendations outlined in the activity description will be followed, this activity must be screened in for this stage of assessment.

5. Potential impacts

Potential construction and decommissioning phase impacts

5.1 During construction the following adverse impacts may occur:

- Pollution of surface water or groundwater (and any designated ecology sites that are water dependent) due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site run-off including dewatering of excavations.
- Temporary impacts on the hydromorphology of watercourses from open-cut watercourse crossings or temporary vehicle access as may be required.

Construction and decommissioning phase mitigation

5.2 The Scheme includes the construction of a Cable Route Corridor to join the Principal Site to National Grid Cottam Substation. This will necessitate the crossing of watercourses and drainage ditches. The construction of cable route crossings of watercourses has the potential to result in modifications to WFD water bodies. Some of these may be temporary such as to provided field access across watercourses or for an open-cut excavation of the channel for the installation of the new cables. Where these are required (and agreed with statutory bodies) a pre-works survey will be undertaken to provide baseline data for full reinstatement of the channel. Where possible, options for enhancement will also be considered.

5.3 It is assumed that the grid connection will cross more significant waterbodies using a non-intrusive and trenchless technique (e.g. horizontal directional drilling (HDD), micro-tunnelling or boring) at a suitable depth beneath the bed level to avoid the risk of future exposure by scour of the bed (typically cables will be at least 1.5 m below the bed of a watercourse).

5.4 Details on construction methodologies are not yet available. It is assumed that solar PV panels will be off set from watercourses by a minimum of 10 m measured from the centre line of the channel (as bank top is a variable feature). The purpose of this buffer reduces the risk of any pollutants entering the watercourse directly or direct physical impacts, whilst also providing space for mitigation measures (e.g. fabric silt fences) should they be required as identified at the PEI and ES stages.

5.5 Construction would be managed using a Construction Environmental Management Plan (CEMP), which would be developed by the Contractor. 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.

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

- Permissions and consents.
- Management of construction site runoff.
- Management of construction site spillage risk including the risk from 'frack-out' events from horizontal directional drilling.
- Management of flood risks and how they may increase the risk of water pollution.
- Management of works within, under and adjacent to watercourses.

5.7 It is anticipated that all WFD construction risks could be adequately mitigated with appropriate planning and management.

5.8 In addition, during decommissioning, potential impacts would be similar to the construction phase although it is anticipated that the power cables would be left in situ beneath watercourses and there would be less excavation works required close to watercourses. There may also be some additional wastewater in pipework of above ground installations that would need to be removed, tested, and potentially treated as waste rather than discharged to a watercourse or to ground.

Potential operation phase impacts

5.9 During the operational phase, the following adverse impacts may occur:

- Impacts on water quality in watercourses and groundwater from run-off and the potential for accidental spillages from new permanent hardstanding and maintenance activities, assuming surface water run-off does ultimately drain to a surface watercourse rather than simply to ground.
- Potential for impact on groundwater or surface water as a result of the use of firewater in the event of a fire in the battery storage areas.
- Potential impacts on hydrology as a result of the Scheme. This may also have a subsequent effect on aquatic habitats and water-dependent nature conservation sites.
- Potential for permanent physical impacts to watercourses if crossings are required for access and depending on the design of the structure used.
- Potential for impact of foul drainage / water supply in the area due to the offices / maintenance facilities required as part of the Scheme.
- The current arable fields are treated with fertiliser and pesticides under current land use. During the life of the project the use of such chemicals will be greatly reduced. In addition, arable farming exerts considerable water resource pressures, which will also be reduced.

Operation phase mitigation

5.10 A Surface Water Drainage Strategy will be undertaken as part of the PEI Report and Environmental Statement to ensure the risk of surface water flooding is not increased as a result of the Scheme, and any increased land take for foundations and any access roads.

5.11 Careful consideration of the SuDS features, in-keeping with local planning policy and through liaison with the Lead Local Flood Authority (LLFA), the three Internal

Drainage Beards (IDBs) and Environment Agency, will be undertaken to ensure that the Surface Water Drainage Strategy adequately attenuates and treats runoff from the Scheme, whilst minimising flood risk to the site and surrounding areas.

5.12 In accordance with planning policy and general good practice, mitigation will be provided by restricting surface water discharge rates and providing on-site attenuation.

5.13 A water quality risk assessment of all above ground installations will be undertaken as part of the Environmental Statement (ES) using the Simple Index Approach described in the SuDS Manual (2nd edition) (CIRIA Ref. 10.21). This will inform what, if any treatment measures are required to manage the risk from diffuse urban runoff to watercourses or ground.

5.14 A Solar Farm Control Centre will be included within the Scheme. The Solar Farm Control Centre will allow around 10 to 12 staff to operate and maintain the plant, in day-shifts only. The plant staff will also grant access to parts of the plant for operations and maintenance works which are typically CCTV surveyed to prevent unauthorized access. Given an on-site presence is required, options may include connecting to the nearest available public sewer or a self-contained independent non-mains domestic storage and / or treatment system. The alternative where this is not possible, would be for a self-contained foul drainage system to a cess tank, with no discharge to ground. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.

6. Conclusion

6.1 This WFD Screening Assessment has been prepared to assess the potential risks to WFD water body receptors' status posed by the proposed solar farm and associated cable route. Assessments have been made based on site and design information available in November 2022.

6.2 On the basis of the information provided to AECOM, this assessment concludes that the Scheme could potentially impact on the WFD status or objectives of those surface water and groundwater bodies in the study area. Furthermore, the Scheme may prevent the achievement of the wider WFD objectives in the Humber and Anglian RBMPs. However, this is a precautionary assessment and reflects the limited scheme information at this stage. As more information becomes available this screening assessment can be reviewed.

6.3 Based on the high-level screening presented above, it is recommended that further WFD scoping is undertaken to determine the level of risk posed by the Scheme to specific WFD biological, hydromorphological and chemical receptors. This would be facilitated through review of available WFD data; targeted field work; and consultation with the competent authority (The Environment Agency) in accordance with Advice Note 18 (Ref. 2-3). The assessment would also include a simple qualitative appraisal of potential impacts; but will not include detailed assessment and mitigation proposals.

7. References

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Ref. 2-2 Environment Agency (2016b). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers. Environment Agency internal position statement, made available to AECOM as part of a data request.

Ref. 2-3 The Planning Inspectorate (2017). Advice Note eighteen: The Water Framework Directive. Available from: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/. Last accessed July 2022.

Ref. 2-4 Environment Agency (2022). Catchment Data Explorer. Available at: https://environment.data.gov.uk/catchment-planning. Last accessed July 2022.

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Ref. 2-7 BGS. (2022). Geology of Britain viewer. Retrieved from Geology of Britain : https://mapapps.bgs.ac.uk/geologyofbritain/home.html. Last accessed July 2022.

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Ref. 3-1 Cranfield University 2022. *The Soils Guide.* Available at: http://www.landis.org.uk. Cranfield University, UK. Last accessed July 2022.