

Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 4 – Technical Appendices

Technical Appendix A9.2 – Water Framework Directive Assessment

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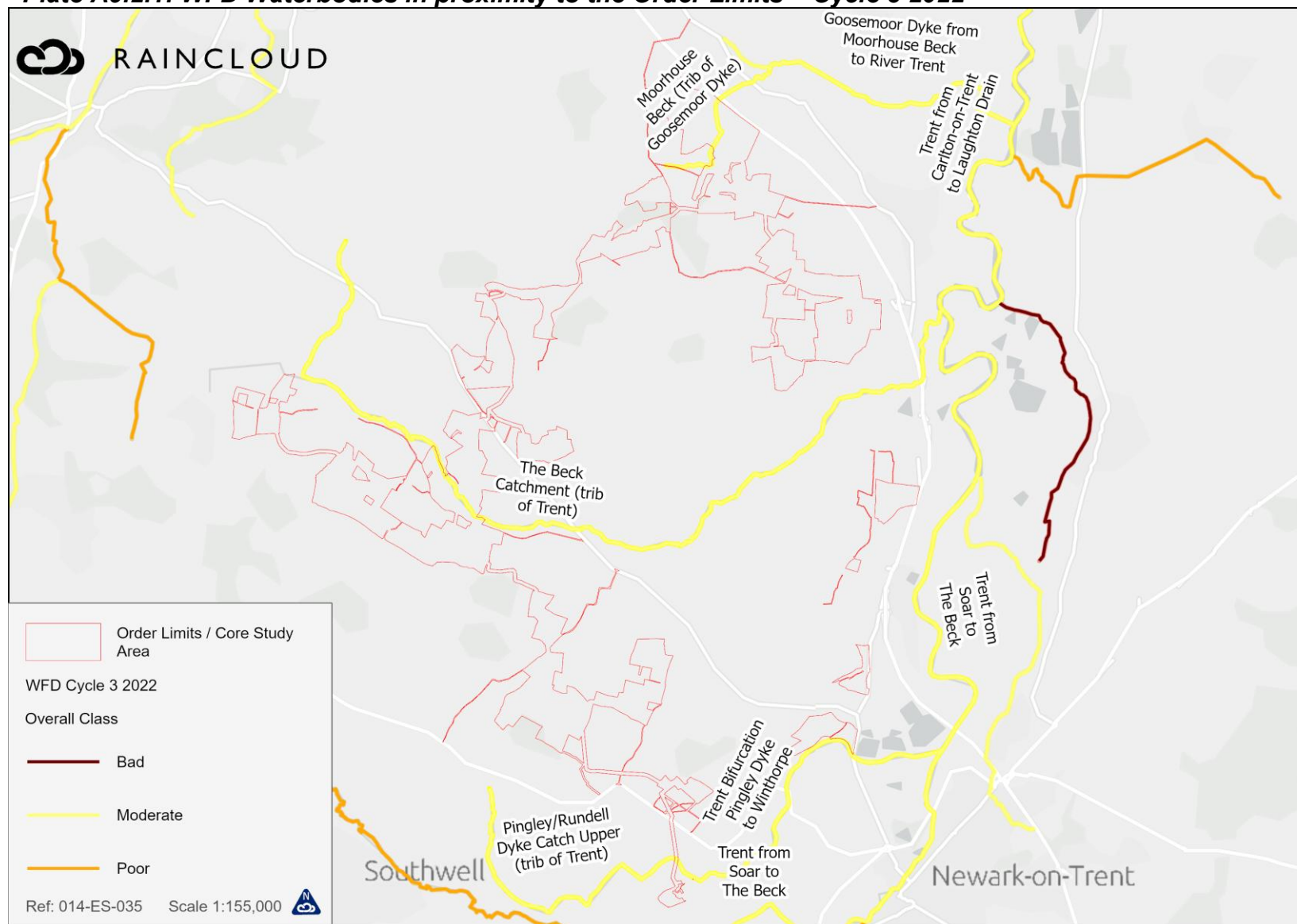
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A9.2.1 INTRODUCTION

- 1 Raincloud Consulting Ltd (Raincloud) has been commissioned by Elements Green Trent Ltd (the Applicant) to produce a Water Framework Directive (WFD) assessment for Great North Road Solar and Biodiversity Park (the Development). The Development comprises the proposed activities within the Order Limits (OL), which define the maximum spatial extent of the Development.
- 2 The WFD requires the preparation, implementation and review of River Basin Management Plans (RBMP) on a six-year cycle. River Basin Districts (RBD) and the WFD Waterbodies that they comprise are important spatial management units, regularly used in catchment management studies.
- 3 The purpose of this assessment is to identify the WFD water bodies (surface and groundwater) with either direct or indirect connectivity to the OL which could be affected by the Development and to assess if the Development will be compliant with the objectives of the WFD. The Core Study Area (CSA) for the assessment is defined as the OL.
- 4 Where figures within this Chapter show the CSA, this also refers to the OL.
- 5 The WFD surface waterbodies in relation to the Development are shown in Plate A9.2.1.

Plate A9.2.1: WFD Waterbodies in proximity to the Order Limits – Cycle 3 2022



A9.2.2 WFD ASSESSMENT

- 6 The OL are located within the primary catchment of the River Trent.
- 7 This assessment is based on the source-pathway-receptor model and identifies the potential pollutant linkages between the sources identified in the screening process on the receptors identified in the scoping process.
- 8 This assessment considers the potential for the Development to have a negative adverse effect on the water quality of the identified WFD water bodies only.
- 9 The assessment is desk-based and the sources of information used to inform each stage of the assessment are outlined in the following Sections.

A9.2.2.1 SCREENING METHOD

- 10 The screening procedure identifies the potential sources of pollution from the Development which could cause deterioration in water quality of the WFD water body. Activities and components related to the Development which could be a source of pollution are identified and those which have been determined not to caused effect. to water quality are 'screened out'. All other activities which are determined to have potential to cause effect are 'screened-in' and considered in the scoping stage.

A9.2.2.2 SCOPING METHOD

- 11 The scoping process identifies the risks of the 'screened-in' activities to potential receptors.
- 12 The WFD water bodies which are hydrologically connected to the Development, either directly or indirectly, are then identified. WFD water bodies identified as indirectly connected are defined as watercourses or water bodies which are hydrologically linked to the Development via other water bodies, e.g., water bodies downstream of the Development and upstream of the WFD water body.
- 13 This scoping assessment has been conducted in accordance with the EA scoping template form¹.
- 14 The following information sources were consulted to obtain information on WFD water body receptors:
 - The EA Catchment Data Explorer;² and
 - EA Water Quality Archive³.

¹ Environment Agency (2017) Scoping Template [Online] Available at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> (Accessed: 14/08/2024)

² <https://environment.data.gov.uk/catchment-planning/>

³ https://environment.data.gov.uk/water-quality/view/explore?search=&area=&samplingPointType.group=&samplingPointStatus%5B%5D=open&loc=545545%2C181242&_limit=500

A9.2.2.2.1 WFD Surface Waterbodies

- 15 The Development is located within the Humber river basin management plan (RBMP). It is located within the operational catchments of the Trent and Tribs and Nottinghamshire South A.
- 16 The WFD water bodies identified as being in direct hydrological connectivity with the Order Limits are listed below:
 - The Beck Catchment (Trib of Trent) - GB104028053440;
 - Pingley/Rundell Dyke Catch Upper (Trib of Trent) - GB104028053420; and
 - Moorhouse Beck (Trib of Goosemoor Dyke) - GB104028058260.
- 17 The WFD water bodies identified as being indirectly connected to the Order Limits are listed below:
 - Goosemoor Dyke from Moorhouse Beck to River Trent (GB104028058270); and
 - The River Trent (from Soar to The Beck (GB104028053110) and from Carlton-on-Trent to Laughton Drain (GB104028058480)).
- 18 Should WFD water bodies with direct hydrological connection to the Development be screened out then by association so will those with indirect connection.
- 19 The WFD status, water quality classification and future objectives of the screened-in RBMP water bodies are detailed in Table A9.2.1, using data from sources set out in Section A9.2.2.2.

Table A9.2.1: Screening of WFD RBMP water bodies

WFD Indicator Cycle 3 2022	The Beck Catchment	Pingley/Rundell Dyke Catch Upper	Moorhouse Beck
Water body ID	GB104028053440	GB104028053420	GB104028058260
Hydro-morphological designation	Not designated, artificial or heavily modified	Not designated artificial, or heavily modified	Not designated artificial, or heavily modified
Ecological Status	Moderate	Good	Moderate
Chemical Status	2022 - Does not require assessment (2019 – Fail)	2022 - Does not require assessment (2019 – Fail)	2022 - Does not require assessment (2019 – Fail)
Ecological Objective	Good by 2027	Good by 2021	Moderate by 2015
Chemical Objective	Good by 2063	Good by 2063	Good by 2063
Screening	Screened-in: WFD water body may be directly impacted by the	Screened-in: WFD water body may be directly impacted by the	Screened-in: WFD water body may be directly impacted by the

WFD Indicator Cycle 3 2022	The Beck Catchment	Pingley/Rundell Dyke Catch Upper	Moorhouse Beck
	Development construction activities which could interact with the local watercourse network during the construction, operation and decommissioning phases.	Development as construction activities which could interact with the local watercourse network during the construction, operation and decommissioning phases.	Development as construction activities which could interact with the local watercourse network during the construction, operation and decommissioning phases.

A9.2.2.2.2 Groundwater

- 20 The Order Limits lie entirely within the Lower Trent Erewash - Secondary Combined groundwater body which has an approximate area of 192,440 ha. Table A9.2.2, outlines the WFD status and objectives of the unit, using data from sources set out in Section A9.2.2.2.

Table A9.2.2: Screening of WFD RBMP groundwater bodies

WFD Indicator – Cycle 3	Lower Trent Erewash - Secondary Combined
Water body ID	GB40402G990300
Chemical Status	Good
Quantitative Status	Good
Chemical Objective	Good by 2015
Quantitative Objective	Good by 2015
Screening	Screened-in: WFD water body may be directly impacted by the Development during the construction, operation and decommissioning phases which include activities which could interact with the local groundwater network.

A9.2.2.3 SCOPING AND ASSESSMENT

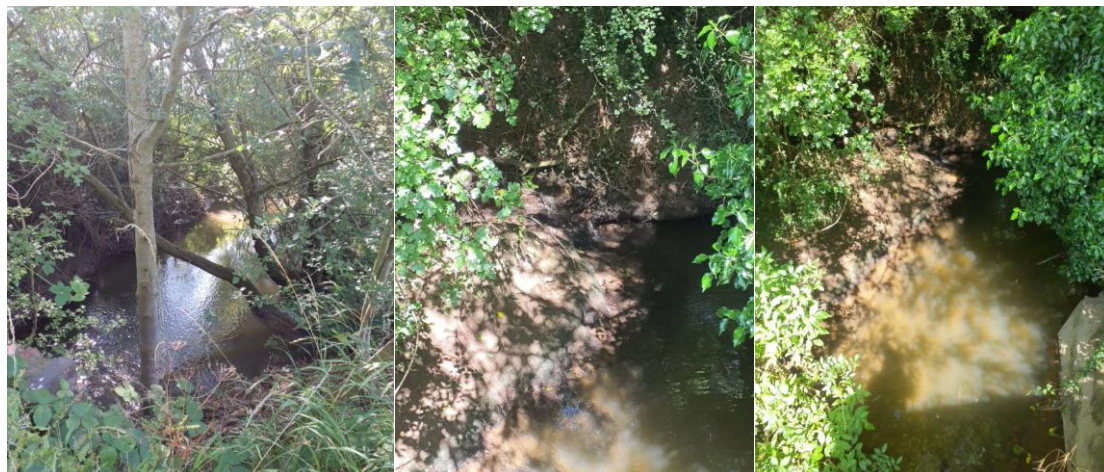
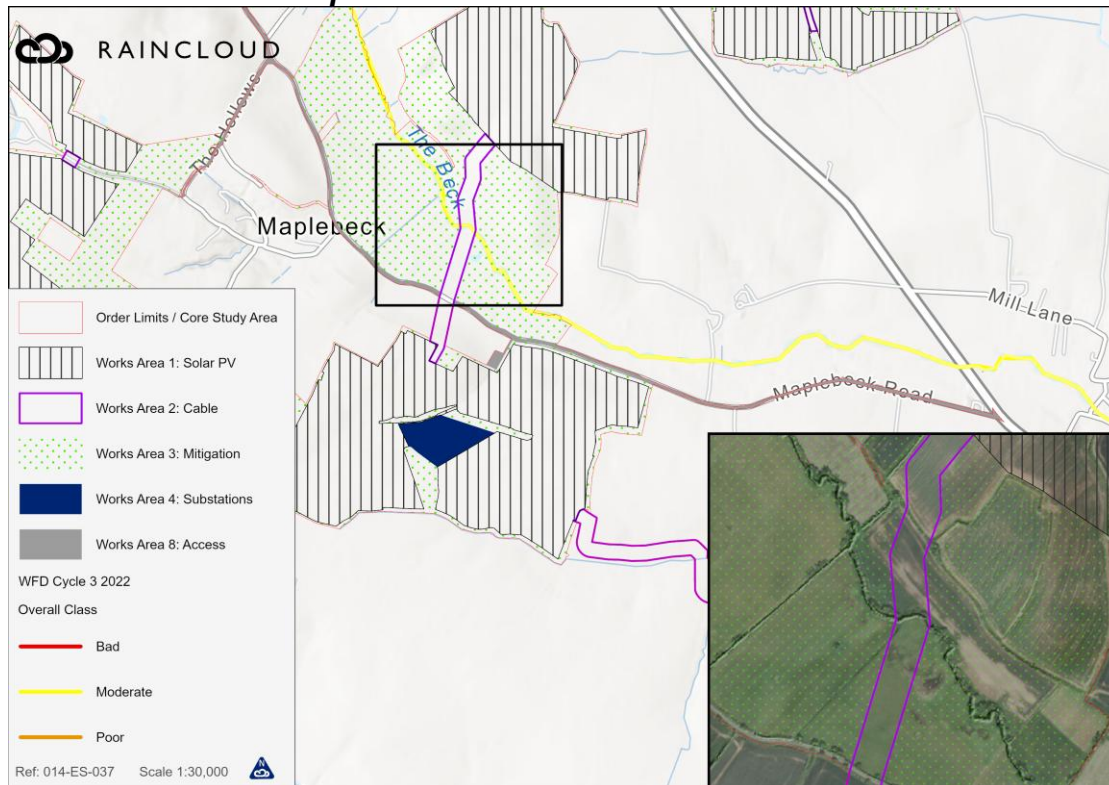
- 21 This section of the assessment presents the scoping and impact assessment of the Development upon the WFD surface water bodies and groundwater unit.
- 22 The assessment takes into consideration the activities of the Development and the watercourses along with the wider draining catchment. Additionally, embedded design (mitigation) measures are taken into consideration and these are provided within the Draft Outline Construction Environmental

Management Plan (oCEMP; ES Technical Appendix A5.3
 [EN010162/APP/6.4.5.3]).

A9.2.2.3.1 The Beck

- 23 The Development interacts with the Beck at the locations shown on Plate A9.2.2.

Plate A9.2.2: Development interaction with The Beck



- 24 The WFD assessment for each WFD component is presented in Table A9.2.3.

Table A9.2.3: WFD Assessment – The Beck

WFD Aspect and Status	Reason for not achieving Good status⁴	Objective	WFD Assessment
Ecological Status Moderate	<ul style="list-style-type: none"> • Agriculture and rural land management • Poor soil management • Sewage discharges 	Good by 2027	<p>Work Area 1 - PV Arrays and Racking system</p> <p>PV Arrays will not be located within 10 m of the edge of watercourses. Wire and post fencing, cabling and access track may be within 10 m of the watercourse.</p> <p>As a result of the embedded design of the Development, such as seeding Work Area 1 with a suitable grass and / or wildflower mix, the overland distance between construction areas and drainage ditches and the relatively flat topography within the fields which comprise Solar PV, surface water runoff generation is likely to be minimal and any silt generated during construction will be entrained within cut off ditches, as outlined in the oCEMP [EN010162/APP/6.4.5.3], before reaching The Beck via land drains and minor watercourses.</p> <p>It is proposed to utilise the existing agricultural access routes that traverse the Order Limits, where possible, and construct additional aggregate access tracks, where required.</p> <p>There may be requirement to improve (e.g. strengthening, minor extensions) existing ditch crossing culverts or install a new crossing.</p> <p>Work Area 2 - Cables</p> <p>The cable corridor is expected to require a trench and working area up to 30 m wide to connect cables around the Order Limits.</p> <p>The cable corridor will cross The Beck by an underground technique,</p>

⁴ <https://environment.data.gov.uk/catchment-planning/v/c3-plan/WaterBody/GB104028053440>

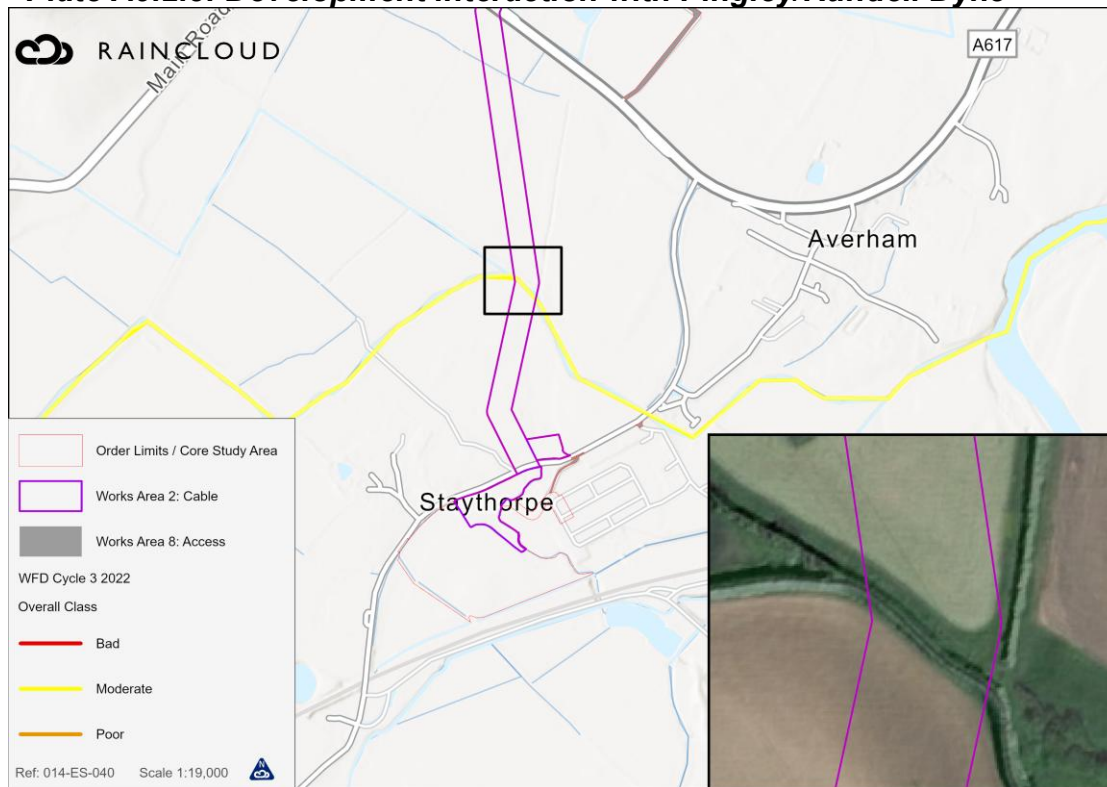
WFD Aspect and Status	Reason for not achieving Good status ⁴	Objective	WFD Assessment
			<p>i.e. horizontal directional drilling (HDD) to install the cable a minimum of 5 m beneath the channel bed. Launch and receive pits would be dug either side of the water body from which the cable would be installed.</p> <p>Direct effects to The Beck and riparian zone will be avoided by the use of HDD. Indirect effects from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling clays (e.g. water-based bentonite) is a possibility if this runoff is not managed. This will be reduced through methods identified in the oCEMP [EN010162/APP/6.4.5.3].</p> <p>HDD is unlikely to interact with the phreatic zone of The Beck due to the depth of groundwater below the surface at Maplebeck and Carlton Lane i.e. in proximity to the cable crossings (see BGS borehole record reference and SK76SE35).</p> <p>Work Area 4 – Intermediate Substations</p> <p>The closest substation is located approximately 550 m from The Beck, meaning there is substantial distance between the works area and the receptor for dissipation and entrainment of sediment and chemicals to occur.</p> <p>Measures within the oCEMP [EN010162/APP/6.4.5.3], such as absorbent spill pads / kits, bunding of fuels / oils will effectively limit the uncontrolled release of chemicals to minor fugitive releases (if at all). These would be minimised through best practice construction methods such as vehicle speed limits and</p>

WFD Aspect and Status	Reason for not achieving Good status ⁴	Objective	WFD Assessment
			regular vehicle and machine maintenance. Work Areas 5 to 7 are located outside the catchment of The Beck. Work Area 8 - Access Utilises existing highways routes in proximity to The Beck and therefore no additional pollution effects from the Development are anticipated beyond the baseline traffic conditions.
Chemical Status Fail	No sector responsible	Good by 2063	The residual effects assessed within ES Chapter 9: Water Resources [EN010162/APP/6.2.9], regarding reduced water quality are not significant as a result of the embedded mitigation measures implemented within the oCEMP [EN010162/APP/6.4.5.3].

A9.2.2.3.2 Pingley/Rundell Dyke

- 25 The Development (Work Area 2: Cable) interacts with Pingley / Rundell Dyke at the location shown on Plate A9.2.3.

Plate A9.2.3: Development interaction with Pingley/Rundell Dyke



26 The WFD assessment for each WFD component is presented in Table A9.2.4.

Table A9.2.4: WFD Assessment – Pingley/Rundell Dyke

WFD Aspect and Status	Reason for not achieving Good status⁵	Objective	WFD Assessment
<p>Ecological Status</p> <p>Good</p>	<p>N/A</p>	<p>Good by 2027</p>	<p>Work Area 1 - PV Arrays and Racking system</p> <p>No PV Arrays will be located within the catchment of Pingley Dyke. As such, there will be no effects.</p> <p>Work Area 2 - Cable Corridor</p> <p>The cable corridor is expected to require a maximum 30 m wide working area to connect cables around the OL.</p> <p>The cable corridor will cross Pingley Dyke by an underground technique, i.e. directional drilling to install the cable a minimum of 5 m beneath the channel bed. Launch and receive pits would be dug either side of the water body from which the cable would be installed.</p> <p>Direct effects to Pingley Dyke and riparian zone will be avoided by the use of HDD.</p> <p>Indirect effects from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling clays (e.g. water-based bentonite) is a possibility if this runoff is not managed. This will be reduced through methods identified in the oCEMP.</p> <p>HDD is unlikely to interact with the phreatic zone of Pingley Dyke as bedrock is less than 1.8 m below the surface i.e. in proximity to the cable crossings (see BGS borehole record reference and SK75SE19).</p> <p>Direct effects to Pingley Dyke and riparian zone will be avoided by having HDD launch pits at least 10 m from the watercourse.</p>

⁵ <https://environment.data.gov.uk/catchment-planning/v/c3-plan/WaterBody/GB104028053420>

WFD Aspect and Status	Reason for not achieving Good status ⁵	Objective	WFD Assessment
			<p>There may be a requirement for vehicles to cross Pingley Dyke and this would be a temporary bailey bridge.</p> <p>Indirect effects from uncontrolled release of construction site run-off that may include high levels of fine sediment, oils and drilling clays (e.g. water-based bentonite) is a possibility if this runoff is not managed. This will be reduced through methods identified in the oCEMP [EN010162/APP/6.4.5.3].</p> <p>Work Area 4 – Intermediate Substations</p> <p>The closest substation is located over 2.5 km from the watercourse. Given the distance between the work area and the receptor, dissipation and entrainment of sediment and chemicals will occur, even in the absence of good practice.</p> <p>Measures within the oCEMP [EN010162/APP/6.4.5.3], such as absorbent spill pads / kits, bunding of fuels / oils will effectively limit the uncontrolled release of chemicals to minor fugitive releases (if at all). These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.</p> <p>Work Area 5a and b – BESS / 400 kV Compound</p> <p>Work Areas 5a and 5b are located approximately 760 m north of the watercourse at its nearest point.</p> <p>Given the distance between the work areas and the receptor, dissipation and entrainment of sediment and chemicals will occur, even in the absence of good practice.</p> <p>Measures within the oCEMP [EN010162/APP/6.4.5.3], such as</p>

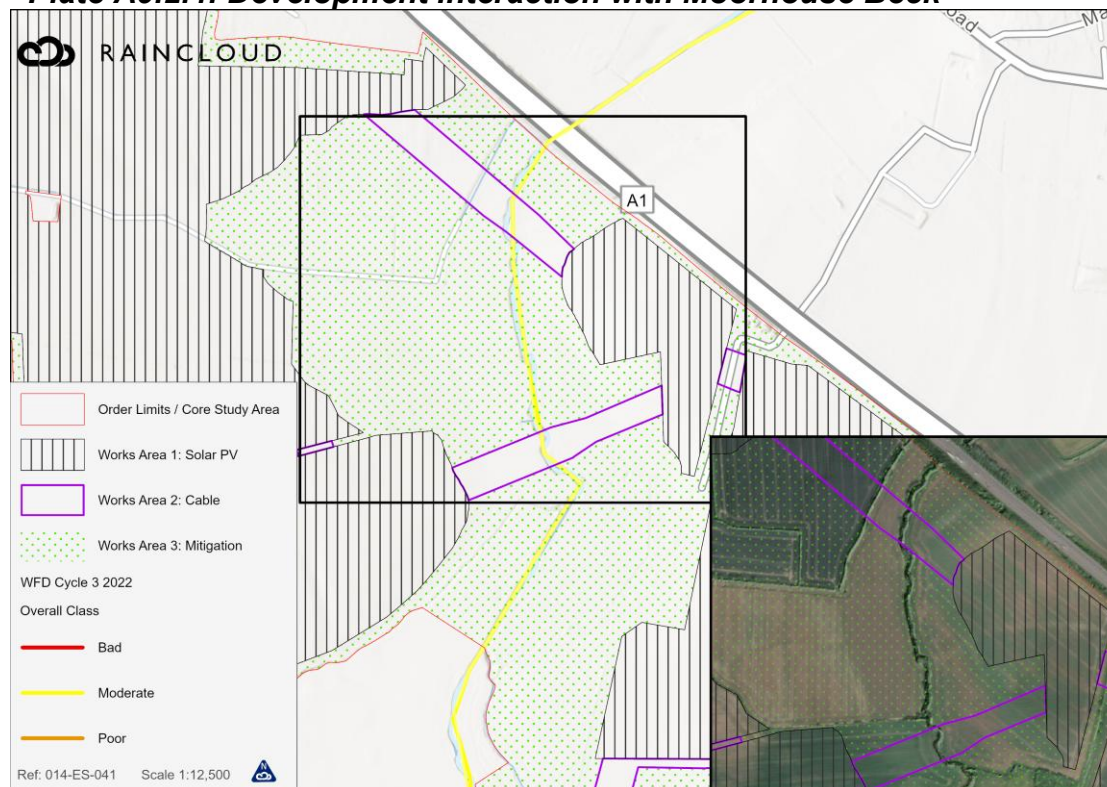
WFD Aspect and Status	Reason for not achieving Good status ⁵	Objective	WFD Assessment
			<p>absorbent spill pads / kits, bunding of fuels / oils will effectively limit the uncontrolled release of chemicals to minor fugitive releases (if at all). These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.</p> <p>There will be a formal drainage system with a penstock on the attenuation feature, designed to the 1 % AEP + 40 % climate change scenario or the NFCC requirement of 228 m³ for fire-suppression. As such, the Development will have the ability to capture and store spent fire suppressant limiting the potential for uncounted releases to the hydrological environment.</p>
Chemical Status Fail	No sector responsible	Good by 2063	The residual effects assessed within ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] regarding reduced water quality are not significant as a result of the embedded mitigation measures implemented within the oCEMP [EN010162/APP/6.4.5.3].

- 27 As there will be no deterioration in WFD status of Pingley Dyke, there will be no deterioration on the WFD status of The River Trent (from Soar to The Beck (GB104028053110) and from Carlton-on-Trent to Laughton Drain (GB104028058480)), located approximately 1.3 km downstream of the Order Limits.

A9.2.2.3.3 Moorhouse Beck

- 28 The Development (Work Area 1: Solar PV, Work Area 2: Cable Corridor and Work Area 3, Mitigation/Enhancement) interacts with Moorhouse Beck at the location shown on Plate A9.2.4.

Plate A9.2.4: Development interaction with Moorhouse Beck



29 The WFD assessment for each WFD component is presented in Table A9.2.5.

Table A9.2.5: WFD Assessment – Moorhouse Beck

WFD Aspect and Status	Reason for not achieving Good status ⁶	Objective	WFD Assessment
Ecological Status Good	<ul style="list-style-type: none"> Agriculture and rural land management 	Moderate by 2015	Work Area 1 - PV Arrays and Racking system PV Arrays will not be located within 70 m of the edge of Moorhouse Beck.

⁶ <https://environment.data.gov.uk/catchment-planning/v/c3-plan/WaterBody/GB104028058260>

WFD Aspect and Status	Reason for not achieving Good status ⁶	Objective	WFD Assessment
	<ul style="list-style-type: none"> • Poor soil management • Farm/site infrastructure • Sewage discharges 		<p>Wire and post fencing, cabling and access track may be within 10 m of the watercourse.</p> <p>As a result of the embedded design of the Development, such as the decision to seed Work Area 1 with a suitable grass mix, the overland distance between construction areas and drainage ditches and the flat topography within the fields which comprise Solar PV, overland flow generation is likely to be minimal and any silt generated during construction will be entrained within cut off ditches before reaching Moorhouse Beck via land drains and minor watercourses.</p> <p>It is proposed to utilise the existing agricultural access routes that traverse the OL, where possible, and construct additional aggregate access tracks, where required.</p> <p>There may be requirement to improve (e.g. strengthening, minor extensions) existing ditch crossing culverts or install a new crossing in Work Area 1 i.e. cross drains and minor watercourses draining to Moorhouse Beck and good practice measures are outlined in the oCEMP [EN010162/APP/6.4.5.3].</p> <p>RSuDS measures will manage surface water within the Order Limits through slowing surface water by interception in grassland in order to drain the Order Limits as per the baseline scenario. In addition, the risk of agricultural diffuse pollution would be reduced from the change in land use as the application of fertilisers and agrochemicals to crops, will no longer take place within PV Array areas.</p> <p>Therefore, there are no anticipated negative effects to Moorhouse Beck.</p> <p>Work Area 2 - Cables</p>

WFD Aspect and Status	Reason for not achieving Good status ⁶	Objective	WFD Assessment
			<p>The cable corridor is expected to require a 30 m wide working area to connect cables around the Order Limits.</p> <p>The cable corridor will cross Moorhouse Beck at two locations by an underground technique, i.e. HDD to install the cable a minimum of 5 m beneath the channel bed. Launch and receive pits would be dug either side of the water body from which the cable would be installed and would be set back from the watercourse by at least 10 m.</p> <p>Direct effects to Moorhouse Beck and riparian zone will be avoided by the use of HDD. Indirect effects from uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling clays (e.g. water-based bentonite) is a possibility if this runoff is not managed. This will be reduced through methods identified in the oCEMP [EN010162/APP/6.4.5.3]..</p> <p>HDD is unlikely to interact with the phreatic zone of Moorhouse Beck due to the depth of groundwater below the surface at Egmonton (Egmonton 60) i.e. in proximity to the cable crossing (see BGS borehole record reference and SK76NE40).</p> <p>Work Area 4 – Intermediate Substations</p> <p>The closest substation is located over 500 m from Moorhouse Beck.</p> <p>Given the distance between the work area and the receptor, dissipation and entrainment of sediment and chemicals will occur, even in the absence of good practice, which is outlined in the oCEMP [EN010162/APP/6.4.5.3].</p>

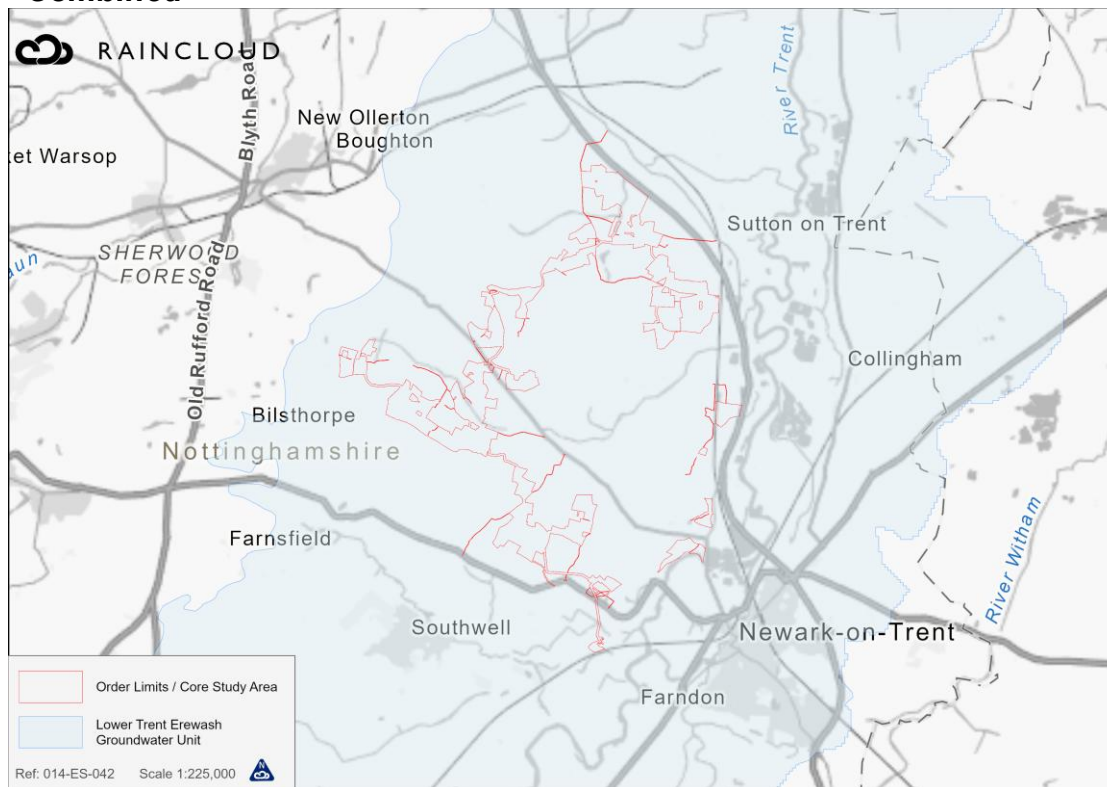
WFD Aspect and Status	Reason for not achieving Good status ⁶	Objective	WFD Assessment
			Work Area 5a and b – BESS / 400 kV Compound Work Area 5a and b are not located within the catchment and therefore there will be no effects on Moorhouse Beck.
Chemical Status Fail	No sector responsible	Good by 2063	The residual effects assessed within ES Chapter 9, Water Resources, regarding reduced water quality are not significant as a result of the embedded mitigation measures implemented within the oCEMP [EN010162/APP/6.4.5.3].

- ³⁰ As there will be no deterioration in WFD status of Moorhouse Beck, there will be no deterioration on the WFD status of Goosemoor Dyke from Moorhouse Beck to River Trent (GB104028058270), located approximately 1 km downstream of the Order Limits.

A9.2.2.3.4 Groundwater: Lower Trent Erewash - Secondary Combined

- ³¹ The Development lies entirely within the Lower Trent Erewash - Secondary Combined groundwater unit as shown in Plate A9.2.5.

Plate A9.2.5: Development interaction with Lower Trent Erewash - Secondary Combined



- 32 The WFD assessment for each WFD component is presented in Table A9.2.6.

Table A9.2.6: WFD Assessment Lower Trent Erewash - Secondary Combined

WFD Aspect and Status	Objective	WFD Assessment
Quantitative Status Good	Good by 2015	<p>Quantitative status is defined by the quantity of groundwater available as baseflow to watercourses and groundwater dependant terrestrial ecosystems (GWDTE), and as a drinking water resource.</p> <p>The ES chapter 9, Water Resources, concludes that the subsurface infrastructure depth i.e. PV racking depth and foundations for aboveground structures will be too shallow to interact with the groundwater table and will therefore not impact flows to public supply boreholes, such as Caunton and Ompton Pumping Station.</p> <p>The impermeable area covered by the Development is likely to be minimal compared to the groundwater catchment (192,440 ha), therefore the effect of the Development on groundwater supply is assessed as negligible.</p>
Chemical Status Good	Good by 2021	<p>The residual effects assessed within PEIR chapter 9, Water Resources [EN010162/APP/6.2.9], regarding reduced water quality from increased sediment loads and acidification with runoff from disturbed ground, soil heaps and excavations and as a result of accidental spillage/loss of chemicals and other construction materials are Not Significant with the implementation of the embedded measures outlined within the oCEMP [EN010162/APP/6.4.5.3] and Outline Fire Safety Management Plan [EN010162/APP/6.4.5.4].</p> <p>As outlined in ES Technical Appendix A9.1.1, FRA [EN010162/APP/6.4.9.1], there will be a formal drainage system with a penstock on the attenuation feature, designed to the 1 % AEP + 40 % climate change scenario or the NFCC requirement of 228 m³ for fire-suppression. As such, the Development will have the ability to capture and store spent fire suppressant, effectively meaning there will be negligible potential for contaminants to interact with groundwater.</p>

A9.2.3 SUMMARY

- 33 This WFD assessment concludes that the Development will not be detrimental to the objectives of the WFD water bodies and complies with the WFD objectives. The Development is assessed as not increasing pollution to the water bodies draining the Order Limits.
- 34 Embedded design and mitigation measures are detailed in ES TA A5.3, oCEMP [EN010162/APP/6.4.5.3], and ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] and these assessments provide a comprehensive assessment of all potential effects and the measures for the reduction of potential effects upon the WFD water bodies.
- 35 The measures have been employed on several large scale construction projects and are effective in ensuring that the WFD status of the water bodies are not affected. No significant effects have been identified in ES Chapter 9, Water Resources [EN010162/APP/6.2.9].
- 36 The ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] concludes that through the implementation of embedded design and mitigation and good practice construction / pollution prevention guidelines the potential effects of the Development can be managed to an appropriate level that will not cause deterioration to the wider catchment.
- 37 As the design includes measures to minimise the potential for chemical release and enhanced erosion protection measures (grass / wildflower mix), it is considered the Development will have positive effects which result in improvement of the adjacent waterbodies and contribute towards achieving WFD objectives.