The Great Grid Upgrade

Sea Link

Sea Link

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1. Introduction

1.1 Purpose of this Technical Note

1.1.1 National Grid Electricity Transmission plc (hereafter referred to as the 'Applicant') is making an application for development consent to reinforce the transmission network in the Southeast and East Anglia. The Sea Link Project (hereafter referred to as the 'Proposed Project') is required to accommodate additional power flows generated from renewable and low carbon generation, as well as an addition to new interconnection with mainland Europe. The reinforcement would be achieved via the construction and operation of a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400 kV overhead line close to Richborough in Kent.

1.1.2 This Technical Note has been produced to support the application for development consent and the accompanying Environmental Statement under the Planning Act 2008. In their Relevant Representation [RR-1586], the Environment Agency raised, for the first time, the potential issue of groundwater heat pollution from buried cables. The concern relates to the potential for heat generated by the cables to 'pollute' groundwater and the impacts this may have on receptors. The solution requested by the Environment Agency is a desk-based assessment.

1.1.3 This Technical Note presents a desk-based assessment of the potential for impacts related to groundwater heat pollution from buried cables.

1.2 Issue

1.2.1 This Technical Note has been prepared in response to comments provided by the Environment Agency in their Relevant Representation (letter dated 23 June 2025) – in relation to pre-examination queries for the Sea Link Project DCO submission. The letter included a representation (ID: EA053) from the Environment Agency that the Environmental Statement (ES) omitted an assessment of risks to groundwater from heat generated by the cable (see excerpt below).

1.2.2 Issue: Omission of assessment of risks from heat generated by the cable to groundwater.

1.2.3 Impact: Heat generated by high voltage cables has the potential to pollute groundwater. If the potential impacts are not adequately assessed, a deterioration in WFD groundwater body status could occur.

1.2.4 Solution: We require the potential thermal implications of buried high voltage cables, in relation to risks to groundwater, to be considered further through desk-based assessment.

1.2.5 The methodology presented in the Geology & Hydrogeology Chapters, **Application Document 6.2.2.5 Part 2 Suffolk Chapter 5 Geology and Hydrogeology [APP-052]** and **Application Document 6.2.3.5 Part 3 Kent Chapter 5 Geology and Hydrogeology [APP-065]** has been presented throughout the various stages of the DCO process, including the Scoping stage and statutory consultation when the

Preliminary Environmental Information Report (PEIR) was published. The assessment of heat generated by underground cables was not requested to be scoped into the assessment for the Geology & Hydrogeology chapters and has not been raised during the various consultation stages of the DCO. The Water Framework Directive (WFD) assessment screened out impacts on WFD groundwater bodies, and this conclusion was consulted on during statutory consultation.

1.2.6 In line with this new request from the Environment Agency, this Technical Note provides a desk based qualitative assessment of the likely risks to groundwater related to potential localised groundwater temperature changes around buried cables (both in shallow open cut trenches and at trenchless crossings).

2. Environmental Setting and Project Context

2.1 Suffolk - Context

2.1.1 Within the Suffolk Onshore Scheme, the cable is brought onshore in a trenchless crossing, making landfall to the east of Leiston Road, Aldeburgh. The trenchless crossing holding the cable transitions to opencut trench at this point and continues as opencut trench until the cable reaches the proposed converter station. Where the cable is buried within the trenchless crossing, the ground conditions are indicated (based on published BGS data and site specific ground investigation information) to comprise superficial Marine Beach deposits and Tidal Flat deposits, overlying bedrock of the Coralline Crag Formation and the London Clay. Once the cable transitions to open cut trench, the ground conditions are indicated to comprise superficial deposits of the Lowestoft Formation, overlying bedrock of the Crag Group.

2.1.2 The Tidal Flat deposits are designated as Unproductive Strata, whilst the Marine Beach deposits and Lowestoft Formation are designated as Secondary A aquifers. In the bedrock, the Crag is designated as a Principal Aquifer, whilst the London Clay is Unproductive Strata.

2.1.3 The anticipated groundwater flow direction within the area of the Suffolk landfall location is anticipated to be generally towards the coast (east/south-east).

2.2 Suffolk – Opencut trenches

2.2.1 The depth of the trenches for the proposed sections of underground cable being constructed via opencut methods in the Suffolk Onshore Scheme are anticipated to be typically 1.5 m depth below ground level (bgl). Information from a preliminary site specific ground investigation, details of which are included in **Application Document 6.3.2.5.D ES Appendix 2.5.S Ground Investigation Report – Suffolk [APP-119],** indicates that the open cut trenches are likely to be formed through the upper parts of the Lowestoft Formation, within which groundwater was typically not encountered at the depth of the proposed opencut trench sections in the exploratory hole locations.

2.3 Suffolk – Trenchless Crossings

2.3.1 One trenchless crossing is currently proposed within the Suffolk Onshore Scheme part of the Proposed Project, as described in **Application Document 6.2.1.4 (F) Part 1 Introduction Chapter 4 Description of the Proposed Project** submitted at Deadline 5.This comprises the onshore cable route and landfall location of the Proposed Project at Aldeburgh.

2.3.2 The landfall location which is proposed to be constructed by Horizontal Directional Drilling (HDD), is the transition from offshore to onshore, where the cable transitions from trenchless techniques to an open cut trench. The trenchless HDD section is

anticipated to be approximately 900 m in length within the onshore study area and would reach a depth of approximately 17 to 25 m bgl for the majority of the length but rising to near surface at the landward extent. This would mean that it would predominantly intercept the Crag Group and the underlying London Clay. Whilst the published geology indicates that the Chillesford Church Sand Member may be present close to the HDD landward extent, the preliminary site specific ground investigation did not identify this. The Crag Group is classified as a Principal Aquifer whilst the London Clay is classified as Unproductive Strata. The HDD landfall location is not within a groundwater Source Protection Zone (SPZ) or a drinking water safeguard zone.

2.3.3 The Environment Agency's (EA) Catchment Data Explorer (Environment Agency, 2024) indicates that the groundwater beneath the study area is part of the Waveney and East Suffolk Chalk and Crag groundwater body (ref: GB40501G400600). This groundwater body received an overall Water Framework Directive (WFD) status of "Poor" in 2019. This is further described as "Poor" status for both chemical quality and quantitative status. The Chalk and the Crag are likely to be in direct continuity in some parts of the catchment, however in large parts of the study area (including the route of the onshore trenchless crossing) they are separated by the Thames Group and Lambeth Group. The groundwater area of the Waveney and East Suffolk Chalk and Crag groundwater body is 145490.871 hectares (ha) according to the Catchment Data Explorer. The onshore area of the Order Limits within which the trenchless crossing is proposed, is approximately 21 ha – this is approximately 0.01% of the overall groundwater body area.

2.4 Kent - Context

2.4.1 Within the Kent Onshore Scheme, the cable is brought onshore in a trenchless crossing, making landfall between A256 Richborough Way and St Augustine's golf course. The cable then crosses A256 Richborough Way in another trenchless crossing before transitioning to open cut trench until it reaches the proposed converter station location.

2.4.2 The ground conditions for the Kent onshore Order Limits are indicated (based on published and site-specific information) to predominantly comprise Tidal Flat Deposits overlying the Thanet Formation and Chalk Formation. However, the Tidal Flat Deposits are indicated to be absent in a section of the route either side of Richborough Way where the Thanet Formation is indicated to be present overlying the Chalk Formation.

2.4.3 The Tidal Flat deposits are designated as Unproductive Strata, whilst the Thanet Formation is a Secondary Aquifer and the Chalk Formation is a Principal Aquifer.

2.4.4 The anticipated groundwater flow direction within the area of the Kent landfall location is anticipated to be generally towards the coast (east).

2.5 Kent – Opencut Trenches

2.5.1 The depth of the trenches for sections of underground cable being constructed via opencut methods are anticipated to be typically 1.5 m depth bgl, and the approximate length of the cable proposed to be buried within open cut trenches in the Kent onshore scheme is 1.5 km. Information from the site specific preliminary ground investigation, details of which are included in **Application Document 6.3.3.5.C ES Appendix 3.5.C Ground Investigation Report – Kent [APP 171]**, indicates that the open cut trenches in the western half of the open cut trench route will be excavated within Tidal Flat

Deposits where groundwater may be encountered (as minor seepages). The preliminary ground investigation information indicates that the open cut trenches in the eastern half of the open cut trench route will be excavated within the Thanet Formation and groundwater is likely to be below the base of the excavations.

2.6 Kent – Trenchless Crossings

2.6.1 Two trenchless crossings are currently proposed within the Kent Onshore Scheme part of the Proposed Project, as described in **Application Document 6.2.1.4 (F) Part 1 Introduction Chapter 4 Description of the Proposed Project** submitted at Deadline 5. These comprise two back-to-back trenchless crossings constructed via HDD along the onshore cable route to the landfall location at Pegwell Bay and then onward underneath the A256 Richborough Way.

2.6.2 The HDD landfall location is the transition from offshore to onshore, where the cable transitions from trenchless to open cut trench. The trenchless HDD section is anticipated to be approximately 750 m in length within the onshore study area and would reach a depth of approximately 18 to 20 m bgl for the majority of the length but rising to near surface at the landward extent. Therefore, it would predominantly intercept the Chalk (Newhaven Chalk Formation). The Chalk is classified as a Principal Aquifer. The HDD landfall location is not within a groundwater SPZ or a drinking water safeguard zone.

2.6.3 The EA's Catchment Data Explorer (Environment Agency, 2024) indicates that the groundwater beneath the study area is part of the East Kent Tertiaries groundwater body (ref: GB40702G501600). This groundwater body received an overall WFD status of "Poor" in 2019. This can be further broken down into a "Good" status for chemical quality and "Poor" quantitative status. The groundwater area of the East Kent Tertiaries groundwater body is 59384.475 ha according to the Catchment Data Explorer. The onshore area of the Order Limits within which the trenchless crossing is proposed is approximately 8 ha – this is approximately 0.01% of the overall groundwater body area.

3. Assessment

3.1 Suffolk Assessment

3.1.1 It is considered that there is very low likelihood of significant effects on groundwater and groundwater receptors from cables buried in open cut trenches because the proposed trenches in Suffolk are above the groundwater levels identified in the preliminary ground investigation and therefore there would be no interaction between cables and groundwater and therefore no impact (not significant).

3.1.2 In relation to trenchless crossings, where the cable intercepts the London Clay, there is a very low likelihood of significant effects on groundwater and groundwater receptors from buried cables due to the London Clay being classified as Unproductive Strata (see definition below).

3.1.3 Unproductive Strata is defined as having very low permeability and 'being largely unable to provide usable water supplies and unlikely to have surface water and wetland ecosystems dependent on them' (Environment Agency, 2025).

3.1.4 It is considered that there is a low likelihood of significant effects on groundwater and groundwater receptors from buried cables at trenchless crossings where the cable intercepts the Crag Group for the following reasons:

- Groundwater within the Crag is likely to be overlain and potentially confined by Unproductive Strata of the Tidal Flat Deposits along parts of the onshore cable route to the landfall location and therefore groundwater that may be potentially heat impacted will not reach the surface. Confinement means that groundwater movement is restricted or constrained by the overlying strata.
- Where there are no confining layers over the Crag aquifer, the depth of the proposed cable in the trenchless crossing is around 20 m along the majority of the length of the onshore cable route and therefore there is likely to be sufficient dissipation of any heat in groundwater potentially impacted by the cables that impacts are small at the surface.
- The very small percentage of the groundwater body within the area of trenchless crossing where there may be interaction between buried cables and groundwater, compared to the overall groundwater body size and volume. The considerable size of the overall groundwater body area means that a substantial volume of groundwater will be moving through the body at any given time.
- The trenchless crossing location is not within a groundwater SPZ.

3.1.5 In conclusion, therefore, the effects of dilution and heat dissipation on any localised groundwater that interacts with the buried cables will be substantial and the risks relating to groundwater temperature changes are considered to be very low.

3.2 Kent Assessment

3.2.1 It is considered that there is very low likelihood of significant effects on groundwater and groundwater receptors from cables buried in opencut trenches because the proposed trenches in Kent are either above the groundwater levels identified in the preliminary ground investigation, or within Unproductive Strata (where groundwater has only been encountered as minor seepages) and therefore there would be limited interaction between cables and groundwater and negligible impact (not significant).

3.2.2 It is considered that there is a low likelihood of significant effects on groundwater and groundwater receptors from buried cables at trenchless crossings where the cable intercepts the Chalk, for the following reasons,

- Groundwater within the Chalk is likely to be overlain and in parts confined by the Tidal Flat Deposits and Thanet Formation along the onshore cable route to the landfall location and therefore groundwater that may be potentially heat impacted will not reach the surface.
- The very small percentage of the groundwater body within the area of trenchless crossing where there may be interaction between buried cables and groundwater, compared to the overall groundwater body size and volume. The considerable size of the overall groundwater body area means that a substantial volume of groundwater will be moving through the body at any given time.
- The trenchless crossing location is not within a groundwater SPZ.

3.2.3 In conclusion, therefore, the effects of dilution and heat dissipation on any localised groundwater that interacts with the buried cables will be substantial and the risks relating to very low.

References

Environment Agency (2025) Protect groundwater and prevent groundwater pollution. Accessible online at https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution

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