

The Great Grid Upgrade

Sea Link

Sea Link

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Document 9.99: Groundwater Flood Risk at the Minster Converter Station Site

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Contents

Executive Summary	1
Ex1.1 Purpose of this Report	1
Ex1.2 Summary of Information Provided	1
1. Introduction	2
1.1 Purpose of this Report	2
2. Groundwater Flood Risk	3
2.1 Background	3
2.2 Regional Setting	3
2.3 Geology and Hydrogeology at the Converter Site	4
2.4 Conclusions	4
3. Current Conditions at the Proposed Minister Converter Station Site	5
3.1 Drone Footage	5
3.2 Flood Alerts	5
4. Conclusions	7
References	8

Executive Summary

Ex1.1 Purpose of this Report

Ex1.1.1 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.

This report has been produced to support the application for development consent and the accompanying Environmental Statement under the Planning Act 2008. In their recent Deadline 4 submission **Application Document: Video evidence of the extent of the flooding on Minster Marshes on the area of the Converter Station build [REP4-146]**, Save Minister Marshes raised concerns regarding the current conditions at the proposed site for the construction of the Minster Converter Station and Substation. In addition a groundwater flood alert was issued by the Environment Agency on the 13 February 2026 for East Kent, which Save Minister Marshes highlighted in the **Late Deadline 4 Submission - Accepted at the discretion of the Examining Authority [REP4-215]**. This note presents further information to address these matters.

Ex1.2 Summary of Information Provided

- Ex1.2.1 Information is provided to characterise the geology and hydrogeology of the Minster Converter Station and Substation site.
- Ex1.2.2 Commentary is provided to interpret the drone video footage submitted by Save Minister Marshes and further context is provided for the recent Environment Agency flood alert for groundwater flooding in East Kent.
- Ex1.2.3 The report concludes that the information presented herein corroborates the assessment of groundwater flood risk presented in **Application Document 6.8 Flood Risk Assessment [APP-292]**.

1. Introduction

1.1 Purpose of this Report

- 1.1.1 In the recent Deadline 4 submission **Application Document Video evidence of the extent of the flooding on Minster Marshes on the area of the Converter Station build [REP4-146]** Save Minister Marshes raised concerns regarding the current conditions at the proposed site of construction for the Minster Converter Station and Substation, in addition a groundwater flood alert was issued by the Environment Agency on the 13 February 2026 for East Kent.
- 1.1.2 This note presents further information addressing these matters.
- 1.1.3 A description of the geology and hydrogeology of the Minster Converter and Substation site, together with commentary on the drone video footage and context for the recent groundwater flood alert are provided.

2. Groundwater Flood Risk

2.1 Background

- 2.1.1 Groundwater flooding occurs when sub-surface water emerges from the ground at the surface, or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of periods of sustained moderate rainfall, or high river levels or tides, driving water through near-surface deposits. This is most likely to occur in areas of porous underlying rocks, like Chalk.
- 2.1.2 Groundwater flooding can be caused both by rising groundwater levels reaching surface, as well as by the development of a shallow water table which therefore impedes rainfall infiltration and increases the risk of surface water flooding (surface flooding driven by groundwater conditions). This is often seen where there are low permeability strata overlying more permeable strata.

2.2 Regional Setting

- 2.2.1 The proposed Minster Converter Station and Substation site is located (regionally) at the base of the slope running from the top of the East Kent chalk downs to Pegwell Bay to the east, and Minster Marshes to the west. The area to the south is drained by a network of canalised watercourses, managed by the local Internal Drainage Board.
- 2.2.2 As is typical in the Kent area, moving from the uplands, formed by the White Chalk and Grey Chalk Subgroups, there is an outcrop of Palaeocene cover that commences with the Thanet Formation. The Chalk Group forms a Principal aquifer from which public and private groundwater abstraction occurs.
- 2.2.3 The Thanet Formation in this part of east Kent is typically overlain by clayey Head Deposits derived from the weathering of the Chalk, Alluvium, and Tidal Flat material. The Thanet Formation ranges from clay and silts to fine sands but is dominated by fine sand with some discrete clay layers locally and is considered a Secondary aquifer due to its variable characteristics.
- 2.2.4 In the East Kent Sandwich Bay area where the Minster Converter Station and Substation is proposed to be located, the Thanet Formation is typically more clay-rich than in the London Basin area (Southern Water Authority 1981 in Jones *et al.* 2000). This is evidenced in the borehole logs that have been collected in a site-specific ground investigation. The presence of more clay rich strata implies a lower permeability than is observed in the London Basin, where there is more sand in the formation. Documented yields are low, although the porosity values (Jones *et al.* 2000) are >30%, but this is in keeping with the high proportion of clay and silt which will have a high retention of water and a low yield. Jones *et al.* describe that where clay predominates, the formations tend to be little-used for water supply, but provide an aquitard of regional extent. An aquitard is a geological formation of low permeability that restricts the flow of groundwater between adjacent aquifers/formations. This is because whilst the Thanet Formation is thought to be in hydraulic connection with the Chalk, the lower permeability of the Formation can result in confinement of Chalk groundwaters, meaning that groundwater movement is restricted or constrained by the overlying strata.

- 2.2.5 The Alluvium/Tidal Flat Deposits can also produce a similar relationship, confining the Thanet Formation, and preventing water from percolating into the system or movement upwards.

2.3 Geology and Hydrogeology at the Converter Station and Substation Site

- 2.3.1 Information from site-specific ground investigation indicates that the proposed Minster Converter Station and Substation site area is underlain by Tidal Flat Deposits (formerly Estuarine and Marine Alluvium), comprising clay and silt, overlying the Thanet Formation and White Chalk Subgroup. Groundwater is shallow, consistent with the flat, low elevation setting within the general area. The Tidal Flat Deposits are classified by the Environment Agency as Unproductive Strata in terms of aquifer classification. The definition of Unproductive Strata is:

“Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them” (EA, 2025).

“They consist of bedrock or superficial deposits with low permeability” (EA, 2017)

- 2.3.2 The presence of the Thanet and Tidal Flat Deposits acts to restrict movement of groundwater from the underlying Chalk and also restricts downward percolation of any surface water from rainfall. The Tidal Flat Deposits themselves are low permeability with restricted ability to transmit any groundwater within them or between adjacent strata.

2.4 Conclusions

- 2.4.1 Groundwater levels in the Chalk aquifer have been monitored following preliminary ground investigations for the Proposed Project. The groundwater levels recorded remained below ground level during the monitoring period. They display a confined response, suggesting that they are confined by the low permeability nature of the overlying Tidal Flat Deposits and Thanet Formation.
- 2.4.2 There is limited potential for groundwater heads in the Thanet Formation and Chalk Group to rise above ground level given the setting and the confined aquifer units. Therefore, it is likely that there is no significant upward flux of groundwater from these deposits.
- 2.4.3 It is considered that the mechanism for the observed wet conditions shown in the drone video footage, is a shallow water table impeding rainfall infiltration and increasing the risk of surface water flooding (surface flooding driven by groundwater conditions) rather than emergence of groundwater from rising bedrock groundwater levels.
- 2.4.4 The local drainage network is present to intercept runoff caused by clay material within the Tidal Flat Deposits and Thanet Formation.

3. Current Conditions at the Proposed Minister Converter Station and Substation Site

3.1 Drone Footage

- 3.1.1 Drone footage from 26 January 2026 was submitted within **Video evidence of the extent of the flooding on Minster Marshes on the area of the Converter Station build [REP4-146]** by Save Minster Marshes. The footage shows an aerial view of the fields south of Minster Stream, where the Minster Converter Station and Minster Substation are proposed to be sited. The ongoing ground investigation (GI) works in the area for the Proposed Project are visible in the video.
- 3.1.2 The footage shows agricultural fields with a patchy coverage of shallow water that has ponded on the surface. It is understood Save Minster Marshes' concern is that the site is prone to groundwater flooding and the land is also referred to as a floodplain. However, as described in Section 2, the observed conditions are not driven by groundwater rising from the bedrock. With regard to the area functioning as a floodplain, the video footage shows no evidence of the local watercourses having overtopped their banks and the shallow water is standing, not flowing anywhere.
- 3.1.3 A review of the ground elevations using LIDAR data (Department for Environment, Food & Rural Affairs, 2025) shows that the observed areas of ponded water generally align with the lowest elevations in the landscape. The waterlogging that is seasonally experienced is therefore considered to be driven by the poor drainage characteristics of the land which does not allow rainfall to freely soak away. Conditions as shown within the drone footage are representative of a very sustained period of rainfall, between December 2025 and February 2026.
- 3.1.4 Save Minster Marshes also raise concerns about the Proposed Project reducing the ability of the land to 'store' water. However, within the Proposed Project's footprint all new areas of impermeable land cover would be served by drainage infrastructure, including the creation of large, shallow basins. The basins would hold both direct rainfall (i.e. rainfall which in wet periods would temporarily sit on the surface of the fields as observed in the drone footage), as well as accommodate rainfall runoff from the permanent above ground infrastructure. Sufficient capacity would be provided to allow discharges back to the surrounding ditch network at pre-development (greenfield) rates. The current function of the land in providing temporary storage for rainfall would therefore be formalised within the basins, compared to the existing ad-hoc ponding that is experienced across the site. Specific details of the drainage strategy are included in **Application Document 9.17.2 (B) Kent Drainage Strategy** submitted at Deadline 5.

3.2 Flood Alerts

- 3.2.1 A groundwater flood alert was issued by the Environment Agency for East Kent in February 2026. Such alerts are issued when rising groundwater levels may lead to flooding of low-lying land, roads and properties with basements.

- 3.2.2 Within a wider region, the following specific areas were covered by this alert: Petham Bourne, Alkham Bourne and Nailbourne, Temple Ewell, Elham, Barham, Bishopsbourne, Bridge, Patrixbourne and Bekesbourne.
- 3.2.3 A review of the geology of these listed areas shows that they are all underlain by unconfined chalk bedrock, with no lower permeability deposits overlying the chalk to impede groundwater from rising to the surface. Their geology is therefore notably different to that within the proposed Minster Converter and Substation site, where, as detailed in Section 2, the Chalk bedrock is overlaid by an aquitard that prevents this potential flooding mechanism.

4. Conclusions

- 4.1.1 Site specific ground investigation indicates that the proposed Minster Converter Station and Substation site area is underlain by Tidal Flat Deposits (formerly Estuarine and Marine Alluvium), comprising clay and silt, overlying the Thanet Formation and White Chalk Subgroup. There is limited potential for groundwater in the Thanet Formation and Chalk Group to rise above ground level given the setting and the overlying low permeability material confining the groundwater in the lower strata.
- 4.1.2 The submitted video footage **Application Document Video evidence of the extent of the flooding on Minster Marshes on the area of the Converter Station build [REP4-146] [REP4-146]** shows agricultural fields with a patchy coverage of shallow water that has ponded on the surface. The conditions are representative of a very sustained period of rainfall, between December 2025 and February 2026, combined with the poor infiltration properties of the shallow local soils and superficial geology.
- 4.1.3 All new areas of impermeable land cover as a result of the Proposed Project would be served by drainage infrastructure, including the creation of large, shallow basins. The basins would hold both direct rainfall and accommodate rainfall runoff from the permanent above ground infrastructure. Sufficient capacity would be provided to allow discharges back to the surrounding network of watercourses at pre-development (greenfield) rates. The current function of the land in providing temporary storage for rainfall would therefore be formalised within the basins, compared to the existing ad-hoc ponding that is experienced across the site.
- 4.1.4 The groundwater flood alert issued by the Environment Agency for East Kent in February 2026 was not specific to the Minster area, which has a markedly different geology to those locations that the alert named as being potentially at risk of flooding.
- 4.1.5 The information presented herein corroborates the assessment of groundwater flood risk presented in **Application Document 6.8 Flood Risk Assessment [APP-292]**.

References

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