Our Ref: KC2005/SS/CA Your Ref:



18 March 2022

Mr Rob Booth DWD Chartered Surveyors & Town Planners 6 New Bridge Street London EC4V 6AB

Dear Sir,

Renewable Connections Underground Cable Connection on land east of Proposed Bicker Solar Farm, (Vicarage Drove), Lincolnshire.

Note on flood risk

Background

An underground High Voltage (HV) cable is required to connect the Bicker Solar Farm substation compound to a nearby existing substation. In August 2021 a Flood Risk and Drainage Strategy report was prepared by Kaya Consulting *"2005 – Vicarage Drove, LincoInshire – Flood Risk Assessment & Drainage Strategy – FINAL"*. The report was based on available information and recommended that the proposed solar site was suitable for development assuming appropriate flood mitigations were implemented (See original report). The Solar Farm and the proposed cable connection are both located within the low-lying Bicker Fen area, which is drained by a network of drains and pumps maintained by the Black Sluice Internal Drainage Board (IDB).

This letter assesses flood risk to the proposed HV cable connection based on available information and conclusions from the Vicarage Drove Solar Farm FRA+DS report.

Site Description

The indicative cable route is approximately 275m long and is shown in **Figure 1**. The northern part of the cable route is within National Grid land comprising grass and scrubland and a small open drainage ditch that runs along the northwest edge of the existing substation.

Further south, the cable route leaves the National Grid land and passes into the Solar Farm site boundary. An unnamed drain will be required to be crossed by the underground cable as it passes into the Solar Farm site. The drain is maintained by the Black Sluice Internal Drainage Board (IDB) and is known as the 'Cross Drain South' which drains from 'Bicker Fen Pump Drain' in a northerly direction at the crossing location to 'Boundary Drain West'.



Figure 1: Indicative Line of proposed cable, showing IDB Drain Crossing Location

Ground levels along the proposed cable route range from 2.3m Above Ordnance Datum (AOD) to 1.5m AOD in the south at the connection point with the Solar Farm (see **Figure 2**). Based on the LiDAR topographic data, the bed of the IDB Drain is approximately 0.2m AOD, with banks at 1.7m AOD. It is noted that LiDAR data may not accurately pick out the bed level, as LiDAR data is not accurate beneath water. However, it provides a reasonable estimate of the bed level.

Proposals

An underground cable is required to connect Bicker Solar Farm to the nearby substation. The client has indicated construction of the cable will be open excavation in areas of open ground and Horizontal Directional Drilling (HDD) will be employed to drill underneath the Drain. This is a construction technique whereby a tunnel is drilled under a waterway or other designated area, and a pipeline or other utility is pulled through the drilled underground tunnel/hole, i.e. no open excavation will take place at the drain crossing. During construction, there will be an entry and exit on either side of the Drain and an open trench through the National Grid land to the point of connection within the existing substation.



Figure 2: Topography of the Site, based on LiDAR (m Above Ordnance Datum)

Assessment

The site lies within the EA Flood Zones 2 and 3, classified by the EA as land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (Flood Zone 2) and land having a 1 in 200 or greater annual probability of sea flooding (Flood Zone 3). It is important to note that EA flood zone maps **do not take flood defences into account.**

Although the site is not directly at coastal or fluvial flood risk due to the presence of an embankment along the main drains, a downstream tidal lock prevents the main drain from discharging into the sea during periods of high tide, in-turn preventing the pumping of floodwaters from the Fens into the drain causing residual flooding at the site.

Further detailed modelling and correspondence with the EA were undertaken during the FRA process (see the report and Appendix in Kaya Consulting, 2021) and the EA have commented that they would not object to the Solar Farm development on the grounds of flood risk so long as essential infrastructure remains operational during the 1000-year plus climate change uplift event.

Given the fact that the current proposals are for a HV underground cable, subterranean development will only be at potential risk of flooding during the construction phase. Once operational, the flood risk will have been mitigated as the cables will be wholly located underground with no interaction with the above ground flood zone. Hence, the cable is not considered to be at flood risk. Appropriate planning and mitigations should be put in place during the construction to minimise working during flood events and high water levels in the Fens.

Crossing of the IDB Drain will be undertaken using HDD techniques. Correspondence with the Black Sluice IDB notes the following:

- The vertical clearance below the hard bed level of the watercourse (drain) affected shall be no less than 2.5 metres;
- Written consent for the works would be required from the IDB following an approved application. *(Email from Operations Manager, Black Sluice Internal Drainage Board, 18/03/22)*

The consent width criteria for the IDB maintained watercourses (drains) is shown in **Figure 3** below. As the underground cable will pass under the watercourse consent from IDB will be required. The same will apply to any above ground working areas (e.g. the entry and exit point for the HDD) within 9m of the edge of the embankment or bank.



Figure 3: Consent Width Criteria for Board Maintained Watercourses

Source: Black Sluice Internal Drainage Board, Policy No: 8, Policy on Relaxation of Board Byelaw No.10 (The 9 Metre Byelaw), 23 November 2021

The drainage ditch within the National Grid land is not an IDB maintained watercourse. It is assumed that this will be crossed via either open cut trenching or HDD. Appropriate mitigation and pollution control measures should be put in place when installing the underground cable under the drainage ditch and the IDB maintained watercourse.

High groundwater tables and low soil infiltration rates are prevalent issues in the Fens due to the lowlying topography (Lincolnshire County Council, 2017) and data from boreholes in the area surrounding the site suggest the water table is found 1.7m below ground level. Groundwater monitoring is generally undertaken as part of a geotechnical investigation in advance of construction. If it is determined that there is a high groundwater table in this area, suitable mitigation measures during cable installation should be undertaken post-determination, if required, to mitigate against the risk from groundwater flooding

Summary and Recommendations

An underground cable is required to connect Vicorage Drove Solar Farm to a nearby substation. This letter assesses flood risk to the proposed cable connection based on available information from the Vicarage Drove Solar Farm FRA+DS report and provides additional information on crossing under the IDB maintained drain.

The Solar Farm and the proposed cable connection are both located within the low-lying Bicker Fen area, which is drained by a network of drains and pumps maintained by the Black Sluice Internal Drainage Board (IDB). The proposed route of the underground cable will pass under an IDB maintained drain and a small unnamed drainage ditch close to the substation. The EA flood maps indicate that the route is within Flood Zones 2 and 3. However, the EA has commented that they would not object to the Solar Farm site development on the grounds of flood risk so long as essential infrastructure remains operational during the 1000-year plus climate change uplift event.

Given the fact that the current proposals are for a HV underground cable, subterranean development will only be at potential risk of flooding during the construction phase. Once operational, the flood risk will have been mitigated as the cables will be wholly located underground with no interaction with the above ground flood zone. Hence, the cable is not considered to be at flood risk. Appropriate planning and mitigations should be put in place during the construction to minimise working during flood events and high water levels in the Fens.

As the project proposes the use of HDD to connect the cable under the IDB maintained drain, the drain will not be impacted. However, advice from the Black Sluice IDB notes that:

- The vertical clearance below the hard bed level of the watercourse (drain) affected shall be no less than 2.5 metres;
- Written consent for the works would be required from the IDB following an approved planning application.

For sections of the cable route that will be excavated via an open-cut trench, it is recommended that ground levels within the floodplain are either maintained to present-day levels or lowered so that no land raising takes place.

Excavating and HDD has the potential to cut through services such as historical land drainage, if land drains or similar are encountered during construction it is recommended that remediation measures are undertaken to repair the damage.

We trust the above is in order. If you would like to discuss any parts of the above, please do not hesitate to contact the undersigned.

Yours faithfully,

Callum Anderson Technical Director

References

Lincolnshire County Council (2017), Highway & Lead Local Flood Authority, Lincolnshire Development Roads And Sustainable Drainage Design Approach, November 2017 Edition.

Kaya Consulting (2021) 2005 – Vicarage Drove, Lincolnshire – Flood Risk Assessment & Drainage Strategy – FINAL, August 2021

Black Sluice Internal Drainage Board (2021), Policy No: 8 - Policy on Relaxation of Board Byelaw No.10 (The 9 Metre Byelaw), 23 November 2021