TECHNICAL NOTE

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BACKGROUND & SITE LOCATION

The purpose of this technical note is to provide Natural Resource Wales with a hydrogeological impact appraisal for the replacement of the buried electrical cable along a 3km route from Penrhos substation, Holyhead (E:226890, N:380639) to Tower EV86 (E:229387, N:379839) in Anglesey, North Wales (a site plan has been included in the supporting documents). that National Grid Electricity Transmission ('National Grid ') proposes to undertake. Morgan Sindall, the main contractor, have applied to Natural Resources Wales for abstraction permits to maintain excavations into the underlying aquifers during installation of the new cables. The scheme primarily entails a new 132kV cable route to replace the existing oil filled cables, approximately 3km in length between Penrhos Substation and Tower EV86.

Other potential environmental impacts from the works have been covered in the Environmental Risk Assessment and Non- Technical Summary which will be provided in support of the discharge permit applications.

DEWATERING ACTIVITIES

The cable replacement scheme requires excavations to expose the existing cable which will be cut, drained of cooling liquid and removed with a new cable being immediately installed in its place within the existing trench which will be widened. The existing joint bays, constructed out of concrete during the installation of the original cable, will be retained and reused. The excavations must remain dry throughout the works in order to prevent the cables being compromised and potentially failing. It is anticipated that during dry periods the cable trench will be above groundwater level for much of the route; however, it is possible that during periods of rainfall the trench will become inundated with surface water runoff as the eastern end of the cable corridor is renown for poor drainage conditions. Sectional drawings of the cable route show the cable route elevation. Tower EV86 is situated at an elevation of approximately 2 mAOD with elevation rising to the west, reaching a high of 17m AOD 30m to the east of Gorad Road before gradually declining to elevations of 4 mAOD along Stanley Embankment. At the western end of Stanley embankment elevation gradually rises once again to elevations of approximately 10 mAOD at Penrhos Substation.

The proposed cable corridor crosses over the Cymyran Strait on the northern edge of Holyhead Road along Stanley Embankment. Along Stanley Embankment the existing cables sit within concrete troughs, and it is understood that the scheme proposal is to re-use these concrete troughs for the new cables. There are also existing fibre optic ducts in the carriageway along the embankment.

In order to facilitate efficient dewatering of the excavation a sump will be excavated at regular intervals along the route of the cables to collect any water that infiltrates through the ground into the excavation. It is proposed that cable laying will be undertaken along 20m sections. This means that there will be a maximum of 1 abstraction point operating at any one time.

Ground conditions observed along the cable route around Tower EV86 suggest pumping rates of up to 250m3/day would be expected to maintain excavations in a dry state.

The water will be discharged to ground some distance from the excavation following removal of any suspended solids. A number of locations are proposed along the route which will be used as the excavation work progresses.

IDENTIFICAITON OF RISKS FROM GROUNDWATER ABSTRACTION

Due to the relative lack of historic development along the route the overall likelihood of contamination is considered to be low to moderate. Areas of made ground and potential contamination may be encountered during the intrusive investigation, particularly at the location of the existing Derwyn garage. Additionally, Penrhos Substation has been remediated following the explosion of a transformer on site in 2008, resulting in a large release of transformer oil. Subsequent monitoring presented within the contamination validation report, 2020, has found no evidence of residual contamination. Suitable control measures including segregation during excavation will be employed to prevent these materials coming into the contact with the groundwater or otherwise migrating towards the Cymyran Strait.

There are four protected sites along the cable route as follows:

- Beddmanarch-Cymran SSSI; and
- Beddmanarch Bay Shellfish Protection Area,
- North Anglesey Marine SAC; and
- Ynys Mon AONB

RPS do not consider it likely that the cable replacement works including any dewatering will have any impact on the protected sites as all construction works over the Cymyran Strait will take place in exisiting troughs.

Groundwater is expected to be present beneath the site within the highly indurated rocks of the fractured, Upper Cambrian Mica Schists. Dewatering excavations will not affect the levels of water in the aquifer, as the water abstracted will be low in volume and either be returned to the ground via the associated consented discharges. There is the potential that dewatering activities may mobilise low levels of suspended solids during the works due to the nature of groundwater ingress into excavations. This will be removed prior to discharge using on-site clarifiers.

The route passes through Secondary B and Secondary Undifferentiated aquifers. The entire route is classed as a low productivity aquifer, as such groundwater ingress into the excavation is likely to be limited.

The classification of groundwater vulnerability is classified as medium to high for the entire length of the route as shown within the Simplified Groundwater Vulnerability map on NRW's Interactive Map Viewer.

The solid geology comprises the following lithologies along the cable route:

- New Harbour Group – Fractured Cambrian Mica Schists and Psammite.

Superficial deposits are generally prevalent and spatially extensive along the route, but this is yet to be confirmed through site specific ground investigation. Superficial deposits consist of Devensian Glacial Tills, Coastal Zone Deposits in the area of the Stanley Embankment and Tidal Flat Deposits at the Eastern End of the Corridor

SUMMARY

Risks to the environment from the abstraction of water containing sediment and its discharge have been covered within the Environmental Risk Assessment, submitted in association with the discharge consent. Mitigation measures have been put in place and the discharge permits have limits on pH and suspended solids.

There are no hydrogeological impacts arising from the proposed dewatering of the excavations. The water will be returned to the ground directly adjacent to the cable route and as such will not alter the hydrogeological mass balance.