GEOTECHNICAL – WANSFORD CROSSING

THE NATIONAL GRID ELECTRICITY TRANSMISSION PLC (SCOTLAND TO ENGLAND GREEN LINK 2) COMPULSORY PURCHASE ORDER 2023

SUMMARY STATEMENT

STATEMENT OF EVIDENCE

Martin Perkins

Principal Geotechnical Engineer

Murphy Technical Services Ltd on behalf of National Grid Electricity Transmission plc

1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Martin Perkins, I am a Principal Geotechnical Engineer within Murphy Technical Services working on behalf of National Grid Electricity Transmission Plc (NGET). I hold a BSc (Hons) Degree in Applied Geology (1996) and I am a Fellow of the Geological Society (2002).

1.2 In my role on this project, I am responsible for the review of all project specific and publicly available geotechnical information for the purposes of identifying feasible trenchless crossing techniques at Wansford Lock.

1.3 Section 1 of my evidence details my qualifications and experience to date.

2. INTRODUCTION AND SCOPE OF EVIDENCE

2.1 The purpose of my evidence is to explain the engineering design and construction methodology of the SEGL 2 Project (the **Project**), specifically the trenchless crossing at Wansford.

3. OVERVIEW OF THE CROSSING AT WANSFORD

3.1 Section 3 of my evidence provides an overview description of the crossing area at Wansford.

4. THE PHYSICAL AND GEOTECHNICAL CONDITIONS AT WANSFORD

4.1 Section 4 of my evidence provides specific detail on the geotechnical conditions at Wansford.

4.2 Section 5 of Appendix A of my evidence provides detail about the findings at this location, including the historic and published information, indicating varying ground conditions likely along the route of the crossing. The start and end of the crossing is indicated to have been deposited in mixed glacial environments and soils are indicated to comprise firm and stiff clay and /or sand and gravel whilst the middle section is indicated to have been deposited in alluvial conditions, comprising of clay, silt, sand and gravel. Bedrock is indicated to comprise the Flamborough Chalk Formation.

4.3 Limited historic GI data is available, however, where data is available this generally confirms the published geology. Artesian water (upward force) is indicated and pumping has been required historically.

4.4 Preliminary boreholes have been carried out to assess the feasibility of the development for this project.

4.5 Generally, the findings from these boreholes confirm the published data indicating varying thicknesses of soft, firm and stiff clay, loose to medium dense sand, sandy gravel, gravelly sand along with sand and gravel. Chalk bedrock was encountered in all locations between 6.15m and 9.0m below existing ground level. Upon encountering bedrock groundwater under artesian pressure was encountered in all locations.

5. TRENCHLESS SOLUTIONS FOR THE CABLE CROSSING AT WANSFORD

5.1 This section of my statement of evidence provides specific detail on the trenchless solutions that could be employed at Wansford.

5.2 Three Horizontal Directional Drilling (HDD) solutions were considered:

5.2.1 a single long HDD crossing encompassing all features;

5.2.2 two shallower HDDs crossings with open cut tie in works; and

5.2.3 a stich drilled solution where shallow shorter crossings are completed back-to back with tie in works.

5.3 For the long HDD two parallel crossings would be required. On the basis that the design challenges present significant risks to the adoption and suitability of this solution it is not recommended that a long HDD is considered further unless the results from additional ground investigation indicate the risks can be adequately managed.

5.4 The second HDD option comprised two shorter crossings (B1249 & Driffield Canal and River Hull & Main Drain) at each location two parallel crossings would be required. Subject to further ground investigation these crossings could be undertaken at depths where interaction with the artesian groundwater could be avoided. Further ground investigation information is required to fully understand the risks to the crossing and to establish if the risks can be adequately managed and mitigated.

5.5 The third and final HDD option adopts stitch drilling where relatively short crossings are undertaken back-to-back at around 2m depth and the installed cable ducts tied in and buried at the launch and reception pits. Based on the ground investigation information currently available the risks from the gravelly strata and minimal overburden are too high. For this option to be considered further additional ground investigation data should be obtained.

5.6 Auger Boring would require three separate crossings at the B1249 & Driffield Canal, River Hull and Main drain. Based on the information currently available this technique should not be progressed although it is recommended that additional ground investigations and surveys are undertaken to fully understand all risks before the technique is discounted.

5.7 Pipe Ramming would also require three separate crossing in the same configuration as auger boring with work required in the flood zone for the construction of crossings and open cut tie in works. Without further information it is not recommended that pipe ramming is adopted as the preferred technique due to the unguided nature and the concerns over the launch and reception pit temporary works. Further surveys are recommended to fully understand the risks before the technique is discounted.

5.8 Horizontal Down the Hole Hammer, like auger boring and pipe ramming, would require three separate crossings, crossing construction and open cut works within the flood zone and has the same concerns over the temporary works at the launch and reception pits. Based the technique being unproven in UK soils, the unknowns on the interaction with groundwater and the potential issues with launch and reception pit designs it is not recommended at the current stage of the project that DTHH is progressed as a risk managed solution. However further investigations into the technique and the underlying ground conditions are recommended to fully confirm the suitability of the technique.

5.9 Microtunneling (Pipe Jacking) would complete the crossing in a single drive between launch and reception shafts located at the northern and southern extremities of the crossing. This technique is the most versatile with tunnel machines available to accommodate variations in ground and groundwater conditions. Based on the information currently available it is recommended that microtunnelling is adopted as the preferred technique for the completion

of the crossing. It is recommended that further ground investigation is undertaken support the detailed design process and to better understand the ground and groundwater conditions to ensure all the risks can be mitigated as far as reasonably practicable.

5.10 Direct Pipe would also complete the crossing in a single drive from a relatively shallow inclined launch pit. Additional information and studies are required to confirm if the anticipated groundwater flows and pressures can be managed. Further information is required to confirm if Direct Pipe can be adopted as a risk managed solution.

5.11 E-Power Pipe would complete the crossing in a single drive with the duct grouted in place as it is installed. There is limited history of the use of E-Power pipe in the UK and further investigations into the suitability in UK ground conditions would be required to fully assess the feasibility of the technique, further ground investigations are also required to assess if the interaction with the artesian groundwater can be managed.

5.12 Further ground investigation will be required before an optimised solution can be finalised. Based on the geotechnical information currently available a microtunnelled solution scores most favourable, completed as a single end-to-end drive, and I am confident that this solution (subject to further investigation and design) can be built within the planning boundary and within the programme timetable. However, after further investigation the Principal Contractor will be able to provide greater certainty on all of the trenchless crossing solutions, they consider viable.

5.13 It is anticipated that a solution can be developed to remain wholly within the current proposed red line boundary.

6. OBJECTIONS MADE TO THE ORDER

6.1 Section 6 of my evidence details the objections which have been made with specific reference to this Wansford location.

7. SUMMARY AND CONCLUSION

7.1 In my statement of evidence, I have described the physical characteristics of the ground conditions based on the publicly available and scheme specific ground investigation information. Groundwater under artesian pressure encountered at chalk bedrock is the greatest risk to the completion of the crossing using trenchless crossing techniques. Ground conditions are generally considered suitable for the adoption of trenchless crossing techniques although within the superficial deposits the presence of gravel in significant quantities and perched groundwater present risks and requires further investigation.

7.2 Further investigations are required to allow the Principal Contractor and their specialist advisors to further develop and optimise the crossing solution which may include other construction options including HDD.

8. DECLARATION

8.1 I confirm that the opinions expressed in this proof of evidence are my true and professional opinions.

Martin Perkins

16th February 2024