

**THE NATIONAL GRID ELECTRICITY TRANSMISSION PLC (SCOTLAND TO
ENGLAND GREEN LINK 1) COMPULSORY PURCHASE ORDER 2023**

INTERIM DRAINAGE REPORT

LAND DRAINAGE CONSULTANCY LTD

12 SEPTEMBER 2023

1. INTRODUCTION TO LAND DRAINAGE CONSULTANCY LTD

- 1.1 This report was produced by Miles George Flather who has been employed by Land Drainage Consultancy Ltd (LDC) for 12 years. Miles works as a Technical Director and specialises in land drainage. Miles has been supported on this Project by David George Royle who has been employed as a Director and Senior Soils Consultant at LDC for the last 16 years.
- 1.2 Miles is responsible for the management of LDC drainage and soil surveys together with technical inputs on both the Scotland to England Green Link 1 (**SEGL1**) project (the **Project**) and Scotland to England Green Link 2 (**SEGL2**) project. This includes detailed field surveys of soils and drainage features; the collection of information on land drainage systems; the design of mitigation for land drainage and meetings with landowners, occupiers and land agents to obtain information and discuss NGET's proposals.

2. INTRODUCTION TO THE PROJECT

- 2.1 NGET's Construction best practice for underground cable installation version 1 which accompanies the individual HoTs issued by NGET, sets out the best practice for land drainage throughout construction. NGET's Best Practice Guide confirms that NGET will instruct a drainage consultant to provide pre and post construction drainage plans and sets out NGET's approach to drainage.
- 2.2 LDC is aware that NGET has made a compulsory purchase order (**CPO**) in respect of the Project. LDC is aware that, following the CPO being made, there have been objections from the National Farmers Union (**NFU**) as well as landowners to the Project with regards to the burial depth of the cable, wanting it increased from 0.90m to 1.20m.
- 2.3 In light of representations made by the NFU and landowners following the making of the CPO, NGET appointed LDC, an independent land and drainage consultancy, to advise with regards to cable burial depth, drainage, and soils. This provides confidence to the landowners that NGET is proactively addressing their concerns with regards to burial depth, drainage and soils.
- 2.4 This report sets out the key findings and recommendations drawn from a desktop study, limited landowner and occupier meetings and limited site surveys.

3. SCOPE OF WORKS AND PURPOSE OF REPORT

- 3.1 The purpose of this Report is to consider the baseline for land drainage and soils in the area of the Project and to further assess the land drainage and soils position so as to inform discussions with landowners, including in relation to management of land drainage and soils and appropriate cable burial depth for the Project.
- 3.2 This Report is structured as follows:
 - 3.2.1 Section 4 sets out the baseline for land drainage and soils in the Project area;
 - 3.2.2 Section 5 sets out the assessments carried out by LDC to update and better understand the baseline;
 - 3.2.3 Section 6 includes recommendations made to NGET by LDC in respect of the Project; and
 - 3.2.4 Section 7 summarises the conclusions reached.

4. BASELINE

- 4.1 In October 2022, a range of existing datasets were sourced and assessed by LDC as part of a desk study into land drainage and soils along the proposed onshore cable section of the SEGL1 Project.
- 4.2 The study allowed LDC to gauge what sections of the Project are likely to be drained via agricultural drainage systems. The report concluded that approx. 90% of the Project route is likely to be drained in some capacity.
- 4.3 The report advised NGET that where land is artificially drained, mitigation drainage systems, also referred to as ‘pre’ and ‘post’ construction schemes will be required.
- 4.4 The desk study also allowed LDC to provide an understanding as to the types of soils that will be encountered along the Project. This in turn notified NGET that there will be varying limitations and special soil handling requirements throughout the construction phases of the Project.

5. ASSESSMENTS CARRIED OUT BY LDC

- 5.1 LDC attended meetings with landowners, occupiers, their land agents and NGET staff to discuss the SEGL1 Project and to collect information on farming practices, land drainage and soils.
- 5.2 Meetings were conducted between May and August 2023.
- 5.3 Information obtained was used to inform site surveys and formulate recommendations and mitigation drainage designs.
- 5.4 LDC site surveys were undertaken during the week commencing 21st August 2023 and were aligned to the proposed construction rights areas including the proposed HVDC and HVAC routes, proposed convertor station site and temporary construction compounds areas.
- 5.5 Soils were examined by experienced LDC soil scientists using hand-held Dutch augers and spades to maximum depths of 1.20m.
- 5.6 A total of 118 soil auger borings were completed at 100m intervals, and where possible in each agriculture enclosure, over the proposed working width and recordings made of topsoil and subsoil depth, texture, stone content, drainage and structural characteristics. additional borings were undertaken, where appropriate, to further refine soil boundaries or to confirm the nature of more stony subsoils where impenetrable horizons occur.
- 5.7 Topsoil samples (0-150mm depth) were collected from fields along the route and tested for pH, available phosphorus (P), potassium (K), magnesium (Mg), total calcium (Ca) and particle size distribution (PSD). This information will be used to derive Agriculture Land Classification (ALC) grades for land affected by the Project.
- 5.8 Due to the notable presence of colliery spoil, further samples were collected for laboratory analysis to identify potential toxic and trace elements.
- 5.9 Soils observations were made according to the Soil Survey Field handbook, Technical Monograph No 5, Harpenden 1974.
- 5.10 LDC site surveys also included an assessment of existing drainage features (ditches, outfalls, ponds, inspection chambers, land use, topography etc.) within and adjacent to the proposed

working areas by an experienced land drainage consultant. Features were surveyed on site using a Global Positioning System (GPS) and levels taken in key areas of the proposed working areas and at locations where off-site drainage may be required. This information has been digitized and will be used by LDC to inform land drainage mitigation as detailed construction designs evolve.

5.11 At the time of writing this report, LDC had completed land drainage surveys along 87% of the Order Land. Soil surveys had been completed across 85% of the Order Land.

5.12 Soil auger boring details have been catalogued and information on land drainage has been mapped and conceptual pre-construction drainage designs drafted.

5.13 Following review of survey results, LDC can make the following statements:

1. Surveyed Order Land comprises of three main soil types: deep medium (7%); medium to heavy (30%); and heavy soils (31%). A notable proportion of the route is affected by historic coal mining operations typical of the area and accounts for 12% of the Order Land. This is considered 'disturbed' land. Land where there are no soil resources (roads etc) totals 5% of the Order Land. Finally, 15% of the Order Land is yet to be surveyed by LDC.

2. Over 90% of the Order Land is currently used for production of arable cropping, notably cereals and oil seed rape or is in a grass ley, be it for grazing or haylage and silage production.

3. LDC expects that pre-construction land drainage will be required across 83% of the Order Land that has been surveyed to date.

5.14 Once site surveys have been completed and soil laboratory results have been received, LDC will provide NGET with the following at the earliest opportunity:

1. *Soil Resource Assessment and Soil Handling Recommendations Report* including Soil Type and ALC Plans and table containing complete soil auger boring details.

2. *Land Drainage Assessment Report* including details of existing land drainage schemes, recommended further work and advice on required drainage mitigation. The report will be supplemented by Conceptual Pre-Construction Drainage Design Plans which will be presented on a field-by-field, landowner-by-landowner basis.

6. RECOMMENDATIONS

Land Drainage Recommendations

6.1 LDC recommends meetings are conducted with landowners and their agents who have yet to be engaged with.

6.2 Land drainage surveys should be completed across the remaining 13% of the route. This will allow LDC to formulate a full suite of Conceptual Pre-Construction Drainage Designs and provide site-specific recommendations.

6.3 Following completion of the drainage designs, LDC will be able to supply NGET with a comprehensive report on land drainage.

6.4 Given limited information and evidence of land drainage systems along the scheme, LDC envisage the necessity for an extensive programme of intrusive drainage investigations. The

investigations will be required to confirm the: presence; location; type; size; condition and level of potential existing drains. Information gleaned from the investigations will be used by LDC to verify Pre-Construction Drainage Designs.

Soils Recommendations

- 6.5 Soil surveys should be completed across the remaining 15% of the Order Land.
- 6.6 As soon as soil surveys are completed by LDC, an in-depth report detailing soils present along the scheme as well as soil handing recommendations bespoke to this project, and including handling of colliery spoil can be supplied to NGET.

Cable Burial Depth Recommendations

- 6.7 Landowner and occupier meetings and questionnaires conducted by LDC provided an understanding as to the types of farming practices and cultivation methods currently employed along the SEGL1 Project.
- 6.8 Cultivation methods are a mix of traditional ploughing, power harrowing, rolling etc and direct or combi-drilling.
- 6.9 Landowners and occupiers were asked to confirm on subsoiling depths being carried out. This ranged from 12” to 3ft (0.30m to 0.90m).
- 6.10 Information sourced from LDC’s desk study, landowner meetings and site surveys found no evidence of direct outfall drainage systems. Direct outfall drainage systems which are more commonly found across low-lying land (e.g. The Fens) usually require the burial depths of new underground utilities such as HVDC to be deepened to allow drains to be reinstated to original lines and levels over the utility. This allows the continued ability of the proprietor to jet clear drain runs from the outlets.
- 6.11 LDC are confident that robust and functional pre-construction drainage schemes can be designed along the SEGL1 Project based on a minimal cable burial depth of 0.90m. However, this assumes that the SEGL1 cables will be deepened at specific locations to allow crossing of existing and proposed main land drains and culverts over the cables.
- 6.12 Post-construction or restoration drainage schemes as they are also known are normally installed parallel to cable(s) meaning a proposed minimal cable burial depth of 0.90m should not constrain the ability to affectively re-drain the Order Land. Post-construction drainage schemes can only be considered once detailed construction details and an understanding as to the extents and nature of construction impacts are made available.

7. SUMMARY AND CONCLUSION

- 7.1 Construction of the SEGL1 Project will inevitably impact on agricultural soils and existing land drainage systems.
- 7.2 Agricultural soils and land drainage have been assessed by LDC across the majority of the Order Land (Approx. 85%).
- 7.3 Surveys have allowed LDC to advise NGET on the types of soils and existing land drainage schemes found along the Project.
- 7.4 LDC predicts pre-construction drainage schemes will be required across approximately 83% of the Order Land assessed to date.

- 7.5 Soils surveys found a range of soil types and depths. There are large areas of the route that have been affected by former coal mining operations and other industries. Soils across such areas will require additional considerations and special handling.
- 7.6 Information sought via landowner and occupier meetings and from site surveys has allowed LDC to assess NGET's proposed minimal cable burial depth of 0.90m. Based on the current land uses, farming cultivation methods and types of land drainage systems evidenced across the Order Land, LDC expects that 0.90m, should in most instances have no bearing on current farming practices and land drainage systems. It must be noted that this statement should be quantified by actual evidence of cultivation methods (i.e. subsoiling depths) and confirmed understanding of existing land drainage systems which is only made possible through intrusive investigations.
- 7.7 LDC recommends landowner and occupier meetings, and site surveys are completed as soon as possible. This will enable the production of reports and plans detailing soils and land drainage schemes along the route and will include bespoke advice on mitigating against the impacts of construction.
- 7.8 Continuing dialogue with affected landowners and occupiers will be necessary and is essential to ensure the best possible mitigation is implemented within the framework of the farming systems in place.

Land Drainage Consultancy Ltd

12 September 2023