LAND DRAINAGE AND SOILS

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

STATEMENT OF EVIDENCE

Miles George Flather
Land Drainage Consultancy Ltd

1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Miles George Flather and I have been employed for 14 years as a consultant at Land Drainage Consultancy Ltd (LDCL), Cowslip Offices, Fimber Driffield, East Yorkshire, YO25 9LY. I currently work as a technical director and land drainage consultant.

1.2 I obtained an undergraduate degree (BSc) in Environment Science from The University of Newcastle in 2007 and a postgraduate degree (MSc) in Environmental Systems Engineering from University College London (UCL) in 2010.

1.3 Since 2010 I have primarily been involved in agricultural land drainage surveys, drainage design and remediation of drainage problems on a range of linear developments.

1.4 LDCL advises developers, contractors, landowners and occupiers on the impacts of construction projects in the countryside. LDCL often work at the interface between engineering and agriculture and, whilst this is not unique, this provides us with an opportunity to interact with each party and to provide practical, independent, and technical solutions to mitigate the impacts of construction on farmland across the UK.

1.5 LDCL has provided land drainage and soils advice on numerous high-voltage direct current (HVDC) projects across the country. A list of recent projects LDCL have worked on are detailed below in Table 1, with asterisks marked against projects I have had an involvement on.

1.6 **Table 1: LDCL's project experience in cable route installation**

Date	Client	Length (km)	Project
2000	National Grid	7	Nunthorpe Cable Route (Cleveland)
2007	National Grid	3	Harker Cable Route (Cumbria)
2009	National Grid	10	Hutton Cable Route (Cumbria)
2009	National Grid	5	Frodsham Cable Route (Lancashire)
2008 - 2011	Neary/National Grid	6	Bramley to Didcot (Oxfordshire)
2012 - 2013	Balfour Beatty	30	Humber Wind (East Yorkshire)*
2012 - 2013	Orsted	15	Westernmost Rough (East Yorkshire)*
2014 - 2015	Orsted	11	Burbo Bank (North Wales)
2014 - 2015	Balfour Beatty	3	Ratcliffe – Willoughby (Nottinghamshire)
2014 -2018	Prysmian/National Grid	30	Western Link (Merseyside)*
2016 - 2018	Prysmian/National Grid	3	Western Link (North Ayrshire)*
2015 - 2019	Murphys	3	Torness Cable Route (East Lothian)
2015 - 2017	Murphys	20	Beatrice (Aberdeenshire)
2015 - ongoing	Orsted	70	Hornsea 1 and Hornsea 2 (Lincolnshire)*
2015 - 2018	E-on	28	Rampion Offshore Wind (Sussex)
2016 - ongoing	National Grid	75	Viking Link (Lincolnshire)*

2016	SGN	3	Blackhillock Cable Route (Aberdeenshire)
2017 - 2020	Balfour Beatty	14	Elec Link (Kent)
2017 - 2022	VolkerInfra	34	Moray East (Aberdeenshire)
2017 - 2020	DONG	4	Walney Extension (Lancashire)*
2019 - 2022	VolkerInfra	12	NNG (East Lothian)
2019 - ongoing	SSE	32	Dogger Bank (East Yorkshire)
2019 - ongoing	Orsted	55	Hornsea 3 (Norfolk)*
2019 – ongoing	Orsted	40	Hornsea 4 (East Yorkshire)*
2019 - 2020	SSE	19	Seagreen (Dundee)
2021	RWE	11	Awel y Mor (North Wales)
2021 - ongoing	SSE	3	Berwick Bank (East Lothian)
2022 – ongoing	National Grid	10	SEGL1 (County Durham) *
2022 – ongoing	National Grid	68	SEGL2 (Yorkshire) *
2022 - 2023	Nexans	31	Moray West (Aberdeenshire)
2023	Nexans	43	Celtic Link (Cork, Republic of Ireland)
2023 - ongoing	SPR	36	EA1, EA1N, EA2 & EA3 (Suffolk)
2023 - ongoing	RWE	36	Dogger Bank South (East Yorkshire)

1.7 In my role with National Grid Electricity Transmissions (NGET) on the Scotland to England Grid Link 2 (SEGL2) (The **Project**), I am responsible for:

- Attending meetings with landowners, occupiers, their land agents and NGET representatives from Fisher German to discuss the construction of the onshore element of the scheme and to obtain information on land drainage, farming practices, soils etc and to explain land drainage and soil strategies.
- Coordinating and managing LDCL land drainage and soil surveys.
- Advising NGET on cable burial depth.
- Assisting NGET and Fisher German in securing Heads of Terms (HoTs).
- Formulating conceptual pre-construction drainage proposals on a field-by-field, landowner-by-landowner basis.
- Producing a report detailing existing land drainage systems along the proposed route, the potential impacts of construction activities on land drainage and recommended measures required to mitigate potential impacts.
- Providing a drainage specification and bill of quantities (BoQ) for the drainage contractor tender process.
- Providing technical support to NGET whilst archaeological trial trenches are being carried out.

2. INTRODUCTION AND SCOPE OF EVIDENCE

2.1 The purpose of my evidence is to explain the approach to land drainage and soils along the English Onshore Scheme component of the Project (as defined in Dave Ritchie's proof of evidence).

2.2 My evidence does not address the wider need for the Project, this is addressed by Richard Gott at section 5 of his evidence, or the engineering of the HVDC cable route which is covered by Damian Spurr in his evidence. My statement of evidence is structured as follows:

2.2.1 **Section 3** provides confirmation of LDCL's role on the Project to date.

2.2.2 **Section 4** describes LDCL's future role on the Project.

2.2.3 **Section 5** explains assessments provided by LDCL to NGET with regards to cable burial depth.

2.2.4 **Section 6** provides details on mitigating against the impacts of the UK onshore scheme and includes the general approaches that will be taken in respect of pre-construction drainage, direct outfall drainage systems, post-construction drainage and soils.

2.2.5 **Section 7** addresses some of the objections to the Order on drainage and soils matters.

2.2.6 **Section 8** contains my conclusions based on the evidence provided in Sections 3 to 7.

3. LDCL'S ROLE TO DATE

3.1 In August 2022, LDCL provided NGET with a *Desk Study of Soils and Land Drainage* (Please refer to Appendix 1).

3.2 A range of existing datasets were sourced and assessed by LDCL as part of a desk study into land drainage and soils along the proposed onshore cable section of the Project.

3.3 The study allowed LDCL to gauge what parts of the Project are likely to be drained via agricultural land drainage systems.

3.4 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.

3.5 The desk study also provided an understanding of the varying soil types and geology that will be encountered along the Project. This in turn informed NGET that there will be potential engineering limitations and special soil handling requirements throughout the construction phases of the Project.

3.6 LDCL has attended in person meetings with landowners, occupiers, and their land agents and NGET representatives to discuss the construction of the UK onshore scheme. Meetings are carried out to inform landowners, occupiers and their agents on how land drainage and soils will be managed on the Project.

3.7 The meetings are also an opportunity for landowners to provide information on their land, soils and land drainage systems, the latter usually provided in the form of paper drainage plans.

3.8 In the meetings, landowners and occupiers are asked a series of questions to obtain information on existing land drainage, soils, cultivation methods etc. A blank copy of the questionnaire is provided at Appendix 4.

3.9 To date, LDCL has completed meetings with approximately 95% of all landowners and occupiers affected along the 68 km onshore route.

3.10 On 7th February 2023, LDCL provided NGET with technical support on land drainage and soils at the Project public drop-in session hosted at Driffield Rugby Club.

3.11 Data obtained through land drainage surveys are required by LDCL to develop detailed conceptual pre-construction land drainage proposals. The following information is recorded in the field using GPS:

- Ground levels
- Water levels in outfall ditches, watercourses, ponds etc
- Drainage features such as chambers and outfalls
- Low lying and/or wet areas of fields
- Notable drainage issues
- Current land use / cropping

3.12 In addition to recording information via GPS, land drainage proposals are drafted onto paper plans in the field, detailed design notes made, and several photographs taken.

3.13 At the time of writing this proof, LDCL has completed land drainage surveys on 62 km (or 92 %) of the 68 km of land affected by HVDC cable installation.

3.14 Soil surveys are being conducted by experienced soil scientists at LDCL. Understanding the varying types and characteristics of soils along the route provides a baseline / record of condition of soils before construction works start. The information on soils can be used to advise contractors on soils handling, most notably depths of topsoil when soil stripping is being carried out. LDCL's soil survey methodology and soil physical and chemical properties that are being tested are provided under Section 6 of this report.

3.15 To date, LDCL has completed 575 of 767 soil auger borings along the 68 km of land affected by HVDC cable installation. This is equivalent to 75% of the route.

4. LDCL'S FUTURE ROLE

4.1 LDCL will continue to provide NGET with ongoing technical support in the lead up to the construction phase of the Project, during the construction phase and throughout the reinstatement and aftercare period. Details of LDCL's future roles are provided below.

4.2 Meetings will be held with landowners and occupiers yet to be consulted on the Project and be given the opportunity to provide important information to LDCL on land drainage, soils, farming practices etc.

4.3 LDCL will continue to carry out their land drainage and soils surveys with the aim of completing surveys by late February 2024 and ideally before the start of the Compulsory Purchase Order (CPO) Inquiry on 5th March 2024. The progress of LDCL's surveys is largely dependent on some landowners and occupiers granting access to their land. In addition, some fields along the route have been subject to flooding and access has not been possible.

4.4 LDCL are currently compiling data obtained through their land drainage and soils surveys. Soil auger boring details recorded in the field are being inputted into spreadsheets and maps drawn up showing the different soil types and Agricultural Land Classification (ALC) grades along the route.

4.5 Topsoil samples taken from every parcel of land affected by the cable installation are to be processed and sent to an accredited laboratory to be analysed.

4.6 Conceptual pre-construction land drainage proposals will be drafted for fields where land drainage surveys have been carried out.

4.7 Via a letter of intent, sent by email on 2nd February 2024, NGET confirmed engagement of LDCL to carry out the following elements of work on the SEGL2 scheme going forward:

(a) Provide technical support to the Project throughout the programme of archaeological trial trenches (ATT's). This will include regular site inspections by experienced LDCL consultants to check ground conditions, working methods and to assist with potential drainage and soil issues that may arise.

(b) Review of contractor proposal documents relating to land drainage, surface water management and handling of soils. Review of contractor programmes and specifications and all land drainage proposals developed by the contractor(s).

(c) Coordinate and/or assist with proposed intrusive land drainage investigations. Also record and obtain results from land drainage investigations.

(d) During the main construction phase of the Project LDCL will provide the following services to the Project:

(i) Inspection of pre-construction drainage installation, materials being used including permeable fill.

(ii) Inspection of topsoil stripping and general site development.

(iii) Review of surface water management systems.

(iv) General working and ground conditions, wet weather working advice etc.

(v) Assisting with landowner / project conflicts and complaints.

(vi) Review of contactors post-construction drainage proposals.

(vii) Provide specialist advice on reinstatement of the land and help resolve potential issues that may arise at the final stages of the project.

5. CABLE BURIAL DEPTH

5.1 Several objections relating to land drainage and soils have been raised by landowners, occupiers and land agents. Details of the objection and LDCL's response is provided at Section 7 of this proof. This section specifically addresses objections relating to the proposed burial depths of the cable.

5.2 LDCL 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, requesting the depth be increased from 0.90m to 1.20m.

5.3 Before making the CPO and as part of the engagement with landowners, NGET appointed LDCL to advise the Project on cable burial depth, land drainage, and soils. This hopefully provides confidence to the landowners that NGET is proactively addressing their concerns with regards to burial depth, land drainage and management of soils.

5.4 This builds on the work that LDCL undertook prior to the making of the CPO as part of wider engagement with landowners.

5.5 This includes detailed field surveys of soils and land 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.

5.6 NGET was aware of specific soil and drainage conditions that warranted early consideration of whether a greater minimum burial depth would be appropriate in some areas. Having received comprehensive feedback from landowners and considering the unique underlying geology and the farming and cultivation practices carried out along sections of the route, NGET engaged LDCL to analyse the cable route.

5.7 The analysis is shown on the Cable Depth Plan (See Appendix 2) and is based on the following factors relevant to cable depth:

- 5.7.1 Current and potential future farming cultivation methods and depths, as explained and in some cases evidenced by landowners;
- 5.7.2 Intensity and layout of existing land drainage systems;
- 5.7.3 Propensity for individual outfall land drainage systems;
- 5.7.4 Current and potential land use;
- 5.7.5 Topography and bearing on drain grades, layout of schemes etc.;
- 5.7.6 Soil types and depths – certain sections of the cable route are prone to wind erosion or runoff and there is a potential issue of shrinkage of Carr and Warp land – i.e., there is a potential for reduced cover over cables in these types of areas.
- 5.7.7 Underlying geology; and
- 5.7.8 Flood risk.

5.8 The Cable Depth plan appended to this report is indicative only. The plan shows the route split into two categories.

5.9 Category 1 denotes sections of the scheme whereby NGET expects the HVDC cables to be installed with a minimum depth of not less than 1.20 metres from the surface level to the top of the protective tile laid above the cables.

5.10 Category 1 covers land where agricultural land drainage is present, soils are heavier textured and naturally less free draining and where current farming cultivation techniques such as subsoiling and mole ploughing are more commonly exercised.

5.11 Category 2 are sections of the scheme where NGET have confirmed to landowners that cables will be laid to a minimum depth of 0.90 meters from the surface level to the top of the protective tile laid above the cables.

5.12 Category 2 extends across the Yorkshire Wolds section of the scheme which broadly speaking starts from land west of Lund village to the A1034 public highway south of Market Weighton.

5.13 Soils here are typically shallower, naturally free draining and underlain by solid and/or fragmented chalk. It is highly unlikely that Category 2 land is artificially drained. Farming cultivations across this land are, in most cases limited to ploughing to typical depths ranging from 150-450 mm.

5.14 LDCL soil and drainage surveys and intrusive drainage investigations proposed by the Project will, in due course provide NGET with confirmation as to the whether land drainage is present and what farming cultivation methods are likely to be carried out.

5.15 As addressed in David Rogerson's evidence covering Cable Installation Depth (section 3) 'The current industry wide documentation demonstrates that there is no intention to implement a new minimum installation depth greater than the 0.90m, notwithstanding the requirement based on evidence and agreement to increase this on a case-by-case basis.'

5.16 Furthermore, within David Rogerson's evidence, under the Objections section, there is clear explanation that both existing and proposed land drainage will be treated as a service, requiring cables to cross under land drains or mitigating the impact by diverting the drains, as explained in sections 6.5.5 and 6.5.17 of this proof.

6. MITIGATION OF THE IMPACTS OF ENGLISH ONSHORE SCHEME

6.1 At the time of conducting landowner meetings and in the lead up to the CPO Inquiry, LDCL were not able to provide drainage proposals specific to the fields along the route, having not completed all landowner meetings and surveyed all the land.

6.2 A series of plans were therefore produced by LDCL for the Project to explain the standard approach to mitigating against impacts of construction on land drainage systems. A copy of the plans are provided at Appendix 3.

6.3 The plans are based on a hypothetical project at an unspecified location. Scenarios were developed to illustrate how land drainage should be managed along a cable route scheme such as SEGL2.

6.4 Cable installation will impact agricultural land drainage systems on the route. Existing drainage systems will need to be properly intercepted, diverted away from zones of impact

and be provided with new adequate outfalls. This principle is commonly referred to pre-construction drainage and is described in more detail below:

6.5 Pre-Construction Drainage

6.5.1 At *Stage 1* of Appendix 3, the plan shows information that has been obtained from historical maps, aerial photography, available LiDAR topography data, local knowledge and information gathered from landowner meetings such as drainage plans and current land use/cropping etc.

6.5.2 Relevant information has been digitised onto the plans which are prepared on a field-by-field, landowner-by-landowner basis along the route.

6.5.3 At *Stage 2*, it has been possible to develop conceptual pre-construction drainage proposals. The field has been surveyed by LDCL and several levels recorded using GPS devices at specific locations such as water levels in the outfall ditch and ground levels along the proposed cable route.

6.5.4 LDCL's surveys located the existing main outfall severing the drainage scheme and identified that work to clear parts of the drainage ditch would be required to lower water levels so that the drain outfall would not be submerged.

6.5.5 The conceptual pre-construction drainage proposals include a series of four new land drains running parallel to the proposed cable route (green lines). The purpose of 'interceptor' or 'header' drains is to positively incept existing drains running towards the cable(s), to divert them away from zones of impact (notably the cable trench) and to provide them with a suitable outfall, in the case of this example, a new land drain outfalling into the drainage ditch to the north of the route.

6.5.6 Topography, drainage catchments and the arrangement and intensity of existing drainage systems, and construction layouts largely dictates where interceptors will be required and what size pipes are to be installed. In some scenarios, pre-construction drains are proposed along the low side of the working corridor to prevent existing drains from backing up and flooding the working areas and cable trenches. The interceptor drains on the low side also help dewater the ground which can be beneficial during the construction phase of the scheme, particularly when cable trenches are excavated.

6.5.7 Pre-construction drainage systems are permanent and will not be decommissioned or removed at the end of the project.

6.5.8 Land drainage schemes will be designed to ensure that systems are retained within an individual ownership boundary and to existing outfalls wherever possible.

6.5.9 The pre-construction drainage systems will be designed in a way that best replicates the current layout of drainage schemes.

6.5.10 Drainage designs will attempt, wherever reasonably practicable, to ensure that existing catchments are preserved, and that greenfield runoff rates and flood risk are not significantly altered when compared to those before cable installation.

6.5.11 In many situations, new offsite main drains outside of the project planning boundaries will be required to provide a suitable outfall for header drains.

6.5.12 Pre-construction drainage schemes are installed into the topsoil and are often one of the first construction activities along a linear construction project.

6.5.13 At *Stage 2*, the plans refer to where the Project would be expected to carry out intrusive drainage investigations to confirm the presence, level, type and condition of key existing land drains. Recommended investigations are denoted by the yellow-coloured circles.

6.5.14 Information obtained though intrusive drainage investigations will be used to finalise pre-construction drainage proposals. Essential in this process is confirming the exact location, condition and levels of main land drains that cross the proposed cable corridor. This is explored further in the following stage.

6.5.15 At *Stage 3*, the conceptual proposals of *Stage 2* have been confirmed / finalised having obtained information on existing drains through intrusive investigations.

6.5.16 Noted at the centre of the plan at *Stage 3* is the exact location and depth (to metres above ordnance datum) of an existing main land drain that crosses the proposed cable route. The location and depth of crossing drains to take water from the interceptor needs to be carefully considered prior to construction and discussed with cable design engineers so that depth adjustments can be made to the cable to avoid potential depth co-incidence with the drains.

6.5.17 There will be multiple locations along the scheme where either existing or new main land drains will need to cross over the line of the cables. The depth of the cables, as mentioned above is critical as too is the capacity of the drains crossing over the cables. Main drains crossing over the cables must be of sufficient size and have flow capacities that are appropriate for drainage catchments that may extend several fields away from the Project.

6.5.18 Conceptual land drainage designs are undertaken by LDCL in accordance with the guidelines in ADAS Reference Book RB 345: The design of field drainage pipe systems (HMSO, MAFF 1982) (CD A.34).

6.6 There are several fields along the route that are occupied by land drainage schemes that present technical issues for standard pre-construction land drainage mitigation, as described in section 6.5 of this report. These issues occur in situations where land drains outfall individually or directly into ditches or watercourses.

6.7 Direct Outfall Drainage Systems

6.7.1 *Stages 5, 6* and 7 of the example plans explains how existing drainage systems whereby lateral drains run directly into ditches are expected to be managed on schemes such as SEGL2.

6.7.2 ‘Direct’ or ‘individual’ outfall systems are commonly found where arterial ditch systems are well maintained and often where drainage systems need regular maintenance (jetting) due to soil types and poor gradients.

6.7.3 Through landowner meetings and site surveys, LDCL have identified several fields along the SEGL2 route where direct outfall drainage systems are present. These include the fields at the following approximate locations:

(a) Land north of Fraisthorpe village

(b) Land northeast of Gransmoor village

(c) Land northeast of Skerne village

(d) Land northwest of Gransmoor village

(e) Land north of Hutton Cranswick village

(f) Land south of Market Weighton town

(g) Land at the Land of Nod

(h) Land north of Bursea hamlet

(i) Land north and northwest Portington village

(j) Land south of Brind village

(k) Land north of Asselby village

(l) Land south of Barmby on the Marsh village

6.7.4 Where there is little or no information on the layouts of existing drainage systems, LDCL recommends intrusive drainage investigations are conducted. This process may find additional fields along the route where land is drained via direct outfall systems.

6.7.5 In most cases, landowners and occupiers request that drains are reinstated on a like for like basis, and that they can retain the capacity to drain across the cable(s) at some point in the future when their drainage systems are to be replaced. There are several solutions to dealing with direct outfall systems and the most common method is explored below.

6.7.6 As shown on the plan at *Stage 5*, the field is drained by a series of smaller sized drains (laterals) all which outfall directly into the ditch running along the northern boundary.

6.7.7 Non-intrusive drainage surveys have confirmed the locations, sizes, types, and levels of the outfalls in the ditch and recorded several ground levels at along the proposed construction corridor.

6.7.8 Included at *Stage 5* is a proposed interceptor drain. This may be required for the period of construction to pick up water from the severed drains and prevent it from entering the working areas. Interceptor drains will be required for the period of construction, and they may be retained as either permanent restoration drains, or in the case of the example plan may be temporary.

6.7.9 The plan at *Stage 5* also recommends that all existing drains along the line of the proposed cable(s) are dug onto and the locations, types, conditions, and levels (to meters above ordnance datum) of drains are confirmed. The cable(s) must then be installed at a safe depth below the existing drainage systems so that drains can be reinstated above the cable and the individual outfall characteristic maintained. In

some instances, this may require the cable to be deepened across the full length of the field.

6.7.10 At *Stage 6*, details of the existing drains are presented, and information provided to warn and advise the cable design engineers what depths the cables must be to avoid co-incidence.

6.7.11 The plan at *Stage 6*, would be sufficient for installation by a specialist drainage contractor.

6.7.12 At *Stage 7*, the temporary interceptor drain will have been installed, as too would the cable(s). Existing lateral drains severed and damaged through the installation of the cables would be reinstated across the cable(s) in accordance with a *Cross Drain Specification* which involves laying the drain onto a special concrete lintel over the cable trench.

6.7.13 The reinstatement of drains across the cable(s) will allow the landowner the ability to jet the from the drain outfalls across the full width of the construction area i.e. as per the pre-construction situation. The temporary interceptor drain would then become defunct and serve little or no purpose.

6.8 Soils affected by cable installation processes will take time to recover and the design and installation of new land drainage systems will be required to facilitate a return to agricultural productivity in the short to medium term. This type of system is referred to as post-construction drainage and is explained below.

6.9 Post-Construction Drainage

6.9.1 LDCL also produced plans which show typical drainage works required at the restoration phase of a scheme such as SEGL2. These systems are commonly referred to as post-construction drainage schemes and are depicted on the plan at *Stage 4* by the red lines that run parallel to the cable(s).

6.9.2 At *Stage 4*, the pre-construction drainage will have been installed and the HVDC cable(s). Potential construction haul roads running along the scheme will have been removed and the subsoil surface levelled.

6.9.3 Post-construction drains will be laid parallel to the cables within the working width and are designed to replace drains damaged within the working areas. They also provide an outfall for soil water after loosening operations required to promote soil rehabilitation across the construction zones.

6.9.4 Post-construction drains will be installed immediately before topsoil replacement to mitigate potential siltation and dirty water migrating from site. They are usually taken to an outfall in a ditch or watercourse, or in the case of the example plan, be connected into the main drain that crosses the cable(s) and outfalls into an offsite drainage ditch.

6.9.5 The number of restoration drains required is dependent on the layout of the cable(s); the configuration of pre-construction drains; the working area and the degree of soil structural damage that occurs during the construction phase of the Project.

6.10 The movement, storage and reinstatement of soils will inevitably result in changes to soil physical characteristics. Soil handling recommendations applicable to soil types assessed along the route will in due course be provided by LDCL in the form of a detailed report and accompanying plans. Further details on the management of soils are provided below.

6.11 Soils

6.11.1 It is important that soils affected by cable installation are understood so that they can be managed, protected, and conserved during the development. Soils will need to be carefully removed, stored and replaced during the construction phase, and managed for a period thereafter, to ensure that impacted agricultural land can be returned to its pre-entry condition.

6.11.2 LDCL are carrying out soil resource assessments aligned to the centre of the Cable Construction rights corridor. Soils are being surveyed by experienced soil scientists using a 1.2m hand-held Dutch auger and spade to a maximum depth of 1.00m

6.11.3 Soil auger borings are being completed at 100m intervals, and where possible in each agriculture enclosure, over the proposed working width and recordings made of topsoil and subsoil depths, texture, stone content, drainage, and structural characteristics. Additional borings are being undertaken, where appropriate, to further refine soil boundaries. In each of the main soil types found on the proposed corridor, hand dug profile pits are being excavated, described, and photographed to provide greater detail on soil characteristics.

6.11.4 Representative topsoil samples are being collected from each field along the route to a depth of 0-150mm for arable land and 0-75mm for grassland. These samples are being tested to determine the topsoil pH, levels of available phosphorus (P), potassium (K) and magnesium (M) together with and particle size distribution (PSD) and organic matter content.

6.11.5 Soils observations have been made according to the Soil Survey Field Handbook, Technical Monograph No 5, Harpenden, v4 2022.

6.11.6 LDCL will provide a full record of their findings to NGET in a written report and in plan format.

6.11.7 The information collected from the soil resource assessment will be used to provide a pre-entry record of condition for each land parcel and will provide a soils baseline which can then be used as a comparator for the soils/land returned to the landowner on completion of construction. The information is also used to provide an indication of ALC grade at each point which can be used to inform Project planning, consents, and land rights strategy. The soil survey also provides data to inform LDCL's land drainage designs.

6.11.8 LDCL soil survey information will be incorporated into a detailed written report for the cable route including a description of the soil types found, soil analysis results

and recommendations for soil stripping, storage, and re-instatement. This information is typically provided to NGET and their appointed Principal Contractor who will then use it to produce a Soil Management Plan (SMP) as part of a detailed Construction and Environmental Management Plan (CEMP) for the Project.

6.11.9 Planning Permission Conditions relating to securing mitigation measures in respect of soil management are set out in Planning / Consents Statement of Evidence, Section 9 (East Riding of Yorkshire Council Condition 9 and North Yorkshire Council 14, 35 and 54).

7. OBJECTIONS MADE TO THE ORDER

A total of four objectors have raised concerns about land drainage and soils. Below provides details of each objection including LDCL's engagement with each landowner or occupier and an up to date status of each objection.

7.1 OBJ3

Objection(s)

Long term compromises to Agricultural Drainage: The proposed installation and operation of the underground high-voltage direct current (HVDC) cable, as outlined in the CPO, pose a significant and long- term risk to the agricultural drainage of the land. Proper drainage is essential for maintaining soil quality, crop health, and overall agricultural productivity. Any disruptions or alterations to the land's current drainage systems, due to the HVDC cable project, could result in waterlogging, soil erosion, and reduced crop yields. When the current drainage scheme and planned remediation becomes obsolete it will not be possible to redrain the fields as whole entities due to the presence of the cable. Contractors will not undertake to work in close proximity to the cable.

LDCL's response to Objection(s)

7.1.1 A meeting was held with the landowner on 16th February 2023, during which LDCL provided details as to how land drainage should be managed and what LDCL's roles are on the Project.

7.1.2 At the meeting the landowner provided a series of plans showing existing drainage systems present across fields affected by the Project. The plans confirmed the fields are drained and will provide extremely useful for LDCL's surveys and drainage design process.

7.1.3 Access to survey this land was granted by the landowner on 10th January 2024. LDCL's drainage and soil surveys were completed on 19th January 2024.

7.1.4 Conceptual pre-construction drainage designs covering the affected parcels of land were presented to the landowner during a meeting held on 8th February 2024. LDCL explained the proposals on a field-by-field basis and provided accounts as to how land drainage should be managed throughout the construction phase of the project.

7.1.5 Assurance was given to the landowner in respect of how land either side of the construction corridor will continue to function post completion of the Project and that existing land drainage outfalls across the cables will be maintained and, in some cases, new drainage outfalls provided over the cables to ensure offsite land can discharge to appropriate outfalls (i.e. drainage ditches, watercourses etc).

7.1.6 In terms of the objector's statement referring to how contractors will not undertake work near to the cables, laying new land drains close to or over their asset poses an obvious risk. Crossing of the live cables post completion of the Project will be possible but would require permission from the transmission owner (TO), alternative methods of drainage installation, strict supervision, and require the installation contractor to hold relevant HSE qualifications and sufficient insurance cover.

7.2 OBJ4

Objection(s)

7.2.1 Drainage issues have not been resolved as yet.

LDCL's response to Objection(s)

7.2.2 A meeting was held with the landowner and their land agent on 9th March 2023. LDCL provided details as to how land drainage should be managed and what LDCL's roles are on the Project.

7.2.3 In the meeting, LDCL noted that the landowner was experiencing drainage issues due to a National Gas high-pressure pipeline that runs parallel and close to the proposed SEGL2 route.

7.2.4 The land in question was surveyed by LDCL on 18th October 2023 and a follow up meeting held with the Objectors and their land agent on 8th February 2024. Further accounts as to the nature of the existing drainage problems and potential solutions to rectify the issues were discussed.

7.2.5 LDCL await confirmation from NGET to address the issue of outstanding drainage problems associated with the National Gas high pressure pipeline.

7.3 OBJ7

Objection(s)

7.3.1 Underdrainage: Further information is needed from National Grid on how current and future field drainage will be accommodated once the cables have been installed.

Soils: The treatment and reinstatement of soil during and after construction is another major concern for landowners and has been a significant issue on similar schemes which have been constructed in East Yorkshire over recent years. Specific detail is needed from National Grid on how the current quality of the soil will be assessed pre-construction and how soils will be treated during the construction and restorations phases of the Scheme.

LDCL's response to Objection(s)

7.3.2 A meeting was held with the landowner and their land agent on 14th February 2023. LDCL provided details as to how land drainage and soils should be managed and what LDCL's roles are on the Project.

7.3.3 Access to survey this field was granted by the landowner on 27th November 2023. Drainage and soil surveys were completed across this plot of land by LDCL on 25th January 2024 and 8th February 2024 respectively.

7.3.4 Conceptual drainage proposals for the field in question have been produced and a meeting is arranged with the landowners and their land agent on 16th February 2024. The meeting will be an opportunity to review drainage proposals and to address and hopefully appease the landowner's concerns regarding how current and future land drainage will be accommodated post-construction.

7.3.5 The discussion will also be an opportunity to explain in greater detail how soil quality has been assessed by LDCL and how soils should be managed throughout the Project, referring to Planning Permission Conditions which requires the Project to provide a detailed CEMP and SMP, the latter which is informed by pre-construction soil surveys.

7.4 OBJ9

Objection(s)

7.4.1 Field Drainage: Land drainage is one of the main issues which landowners and occupiers are concerned about on this scheme. The Environmental Statement in the Agriculture and Soils section only states the following "Any land drainage installed for the scheme and any drainage impacted by the scheme, will be installed and reinstated as per agreement between NGET and each individual landowner preconstruction". The 'Project Description' states that land drains will be sealed upslope and downslope where they are crossed by the English Onshore Scheme and care will be taken to ensure that the land will not become waterlogged or flooded as a result. Where new field drains or sections of field drains are installed these will be done so in line with good construction practice.

7.4.2 The NFU and LIG are seeking detail of exactly how field drainage will be dealt with pre and post scheme. Clarity is required of the strategy to be undertaken and how this is fixed within the Order.

7.4.3 Further wording has been agreed within the HoTs under the voluntary agreement but there is still a lack of detail on the strategy that will be followed for the pre- and post-construction of drainage. It is stated that landowners can make representations to a drainage consultant but how does a landowner make sure that the representations are taken forward and implemented.

7.4.4 The NFU and LIG are seeking further details on how field drainage will be reinstated to its pre -construction assessment and how any disputes will be dealt with.

7.4.5 *Soils: The treatment and reinstatement of soil during and after construction is another major concern for landowners and tenants. It is noted that an Outline Soil Management Plan has been submitted as part of the planning application for SEGL2. Limited detail has been provided to landowners and occupiers. Detail is required as to how NGET will reinstate the soil and carry out aftercare to make sure that the soil can be reinstated to its preconstruction condition so that land can be returned to agriculture as soon as possible.*

7.4.6 *The planning documents do state that no development shall take place on site until a Construction Environmental Management Plan (CEMP) incorporating the provisions of the submitted outline CEMP has been submitted to the Local Planning Authority and approved. It does state that the CEMP will include a Soil Management Plan to be informed by pre-construction soil surveys. It is also stated that there is to be Land Restoration Scheme. No information has been forthcoming to explain how soil will be reinstated and the measures that will be put in place to bring the soil back to its condition and quality before the works took place, and especially the detail within the after- care plan. The NFU and LIG on other schemes have agreed wording that has been included within the outline CEMP on soils this provides clarity to landowners and tenants as to what will be carried out and what they can expect as to how soils will be treated during construction and reinstated once the construction is completed. The NFU and LIG would like to know how this is to be secured within the Order.*

LDCL's response to Objection(s)

7.4.7 It is understood that all landowners and occupiers represented by either the NFU and/or LIG have been consulted by LDCL to discuss land drainage and soil matters.

7.4.8 At meetings, LDCL have provided details of the land drainage strategy that should be adhered to on this Project. The drainage strategies are explained via the example pre and post-construction drainage systems plans as shown at Appendix 3 of this report and have not been specific to land along the SEGL2 route.

7.4.9 As soon as all land drainage surveys are completed, LDCL will provide NGET with a comprehensive report which will provide details of existing land drainage systems along the scheme, the potential impacts of construction activities on land drainage and how land drainage impacts should be mitigated. This will include detailed explanations of pre and post construction drainage systems which will hopefully address concerns raised in this objection.

7.4.10 At this stage of the project and in the interest of time, it is extremely difficult for LDCL to provide details as to how land drainage in each field along the 68 km route will be managed. The process of managing land drainage as explained in Section 6 of this report hopefully provides sufficient clarity.

7.4.11 Conceptual pre-construction drainage proposals will be developed by LDCL as soon as land drainage and soil surveys are completed. Given the scale of the SEGL2 project and time required to develop the proposals, LDCL do not expect a full suite of plans to be available before the start of the CPO Inquiry.

7.4.12 With regards to landowners making representations to a Drainage Consultant, every landowner will be given the opportunity to review and provide comment on all land drainage proposals. This process may include LDCL meeting with landowners to provide a clearer understanding of the systems proposed and to take onboard comments made by landowners.

7.4.13 LDCL will be providing a quality assurance role to NGET on this Scheme as set out at section 4.7 of this proof. This will involve reviewing and commenting on land drainage proposals.

7.4.14 As soon as soil surveys are completed and soil analysis results received from the laboratory, LDCL will provide NGET with a Soil Resource Assessment and Recommended Soils Handling report. This document will provide information on the types of soils along the proposed route and soil handling recommendations including soil stripping, storage and re-instatement.

7.4.15 Information on soils as described above will be passed onto the Principal Contractor who will then use the information produce a Soil Management Plan (SMP) as part of a detailed Construction and Environmental Management Plan (CEMP) for the project.

7.5 OBJ19

Objection(s)

7.5.1 *Completing drainage surveys, Licences for such have only been agreed/completed in early September 2023, drainage is of paramount concern to both landowners and occupiers. It is unclear at this stage how drainage is to be dealt with and reinstated.*

LDCL's response to Objection(s)

7.5.2 LDCL attended meetings with Gary Slingsby, his land agent and NGET representatives on 13th March 2023 and 27th October 2023. On both occasions LDCL presented advice on how land drainage and soils should be managed by the Project and what LDCL's current and future roles are on the scheme.

7.5.3 A meeting was held with Messrs Roper, their land agent and NGET representatives on 25th April 2023 and 27th October 2023.

7.5.4 Land drainage and soil surveys have now been conducted by LDCL across land belonging to Gary Slingsby, Messrs Roper and Roy Andrew. Conceptual pre-construction drainage proposals have also been drafted for the land in question.

7.5.5 On 11th January 2024 a meeting was held with Messrs Roper. Conceptual pre-construction drainage proposals specific to their fields were presented and reasonings for the designs provided by LDCL. In addition, LDCL explained how their land drainage should be managed during the construction phase of the project and how drainage will be re-instated.

7.5.6 Proposed mitigation drainage systems at this stage of the Project are conceptual and are based largely on sketches of existing drains and walkover non-intrusive surveys. Final drainage designs will rely on intrusive investigations being carried out across

the fields to confirm the: presence, layouts, types, levels and importantly, the condition of current drainage systems. As soon as intrusive investigations are complete then LDCL will be able to develop appropriate mitigation designs.

7.5.7 LDCL will continue to provide technical support whilst ongoing dialect and negotiations continues between the Project and the objecting parties.

8. SUMMARY AND CONCLUSION

8.1 In my statement of evidence, I have described the approach to land drainage and soils as part of the Project.

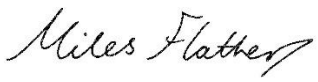
8.2 Land drainage systems and agricultural soils affected by the scheme are currently being assessed by LDCL and potential impacts identified. This understanding will inform the design of mitigation to be implemented by NGET and its contractors and assist in the development of rights being sought within the Order Land.

8.3 Ongoing dialogue with affected landowners and occupiers is required by the Project and is essential to ensure the best possible mitigation is implemented within the framework of the farming systems in place.

8.4 I consider that the approach to land drainage and soils in respect of the Project is appropriate, feasible, and compliant with the relevant standards, codes, and guidance.

9. DECLARATION

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



Miles George Flather

16th February 2024

LAND DRAINAGE AND SOILS

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

STATEMENT OF EVIDENCE

APPENDIX 1, PAGES 1-26

DESK STUDY OF SOILS AND LAND DRAINAGE

nationalgrid

Desk Study of Soils and Land Drainage

Eastern Green Link Two (EGL2)

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk
www.ldcl.co.uk

LDC
Land Drainage Consultancy Ltd

Project	Eastern Green Link Two (EGL2)		
Title	Desk Study of Soils and Land Drainage		
Doc Ref	LDC_NG_EGL2_DeskStudy.pdf		
Date	9th August 2022	**Revision**	A
Author	Miles Flather (LDC)	**Checked**	Ray Lambert (LDC)

Contents

Drawings and Figures

1.0 Introduction

1.1 Background

Land Drainage Consultancy Ltd (LDC) were asked by National Grid Electricity Transmission (NG ET) to carry out a desk study of soils and land drainage along the proposed onshore cable section of the Eastern Green Link 2 (EGL2) Project.

The EGL2 Project includes the construction of a 2GW High Voltage Direct Current (HVDC) link between Scotland and England. The purpose of the EGL2 Project is to scale up the capability of the national electricity network to deliver more green electricity generated in Scotland to the rest of the UK. If approved and completed, EGL2 will be able to carry enough green electricity to power up to 2 million homes across the UK.

This desk study report has been produced specifically for the onshore cable section running from Wilsthorpe to Drax and is referred to as 'the Project'. The scoping boundary for the Project is shown on page 5.

1.2 Proposed Development

Starting at Peterhead in Scotland, the proposed cable route for will run under the North Sea for most of its 505km total length. The subsea cables will make landfall at Wilsthorpe, south of Bridlington. The cable will then run underground onshore for around 68km, to the new converter station and existing substation at Drax.

The planning application for the onshore elements of the Project were submitted in 2022. If approved, construction is expected to be begin in 2024 and finish in 2029.

Proposed route of EGL2 Project – (Source: https://aecomnatgrid.maps.arcgis.com/apps/webappviewer/)

1.3 Purpose of Report

The purpose of this report is to collate and review published information obtained from searches of readily available historical, topographical, hydrological, geological, and soils data sources.

The information presented in this report will be used to inform the Project on the soil and land drainage systems likely to be encountered along the route. The report also advises on potential risks associated with proposed construction activities and identifies where further investigations will be required.

1.4 Limitations

It should be noted that the information sources referenced throughout this report are not exhaustive. Other information, which was not available or did not exist at the time of writing, may become available before the design and construction of the works are complete.

The opinions expressed in this report are based on information obtained from a variety of sources and Land Drainage Consultancy Ltd does not guarantee the authenticity or reliability of the external information referenced. Any conclusions and recommendations will need reviewing as further information becomes available.

2.0 Sources of Information

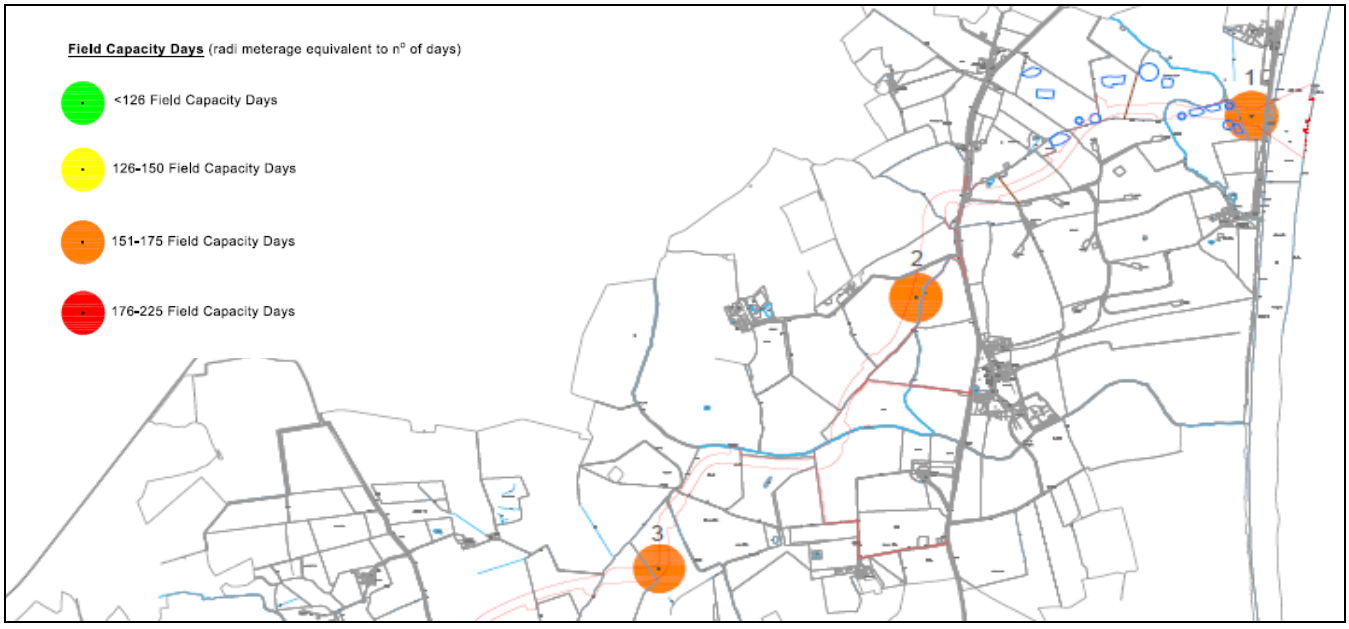
This section of the report provides a summary of information sources and findings. A set of figures showing each data source are appended to this report. Extracts from the figures are provided within the main text.

2.1 Climate

Agroclimatic datasets from the *UK Met Office (1961-1988)* were used to interpolate climate data for points at approximately 5km intervals along the Project.

The Project route has a low to moderate rainfall ranging from 588mm in the south rising to 745mm in the elevated central area between Market Weighton and Dalton, falling to 675mm on the coastal plain at landfall. The Accumulated Temperature (January-June) is moderate, ranging from 1,260-1,399 day degrees C. This rainfall and temperature regime provides a relatively mild and moderately long growing season across most of the route but is increasingly dry south of Market Weighton.

Land is at *Field Capacity* when underdrainage or agricultural land drains would normally be expected to flow. Along the Project, land is at Field Capacity for 124-181 days (i.e. 4-6 months) in a normal year. Local variability will occur, associated with changes in altitude, proximity to the coast and where local rainfall patterns dictate. The climate leads to the land along the Project being at Field Capacity for an extended period over winter. This is likely to present challenges during the construction phases of the Project, specifically for soils handling and re-instatement, which are discussed later in this report.



Extract from Figure 1 (Climate) – (Source: UK Met Office (1961-1988)

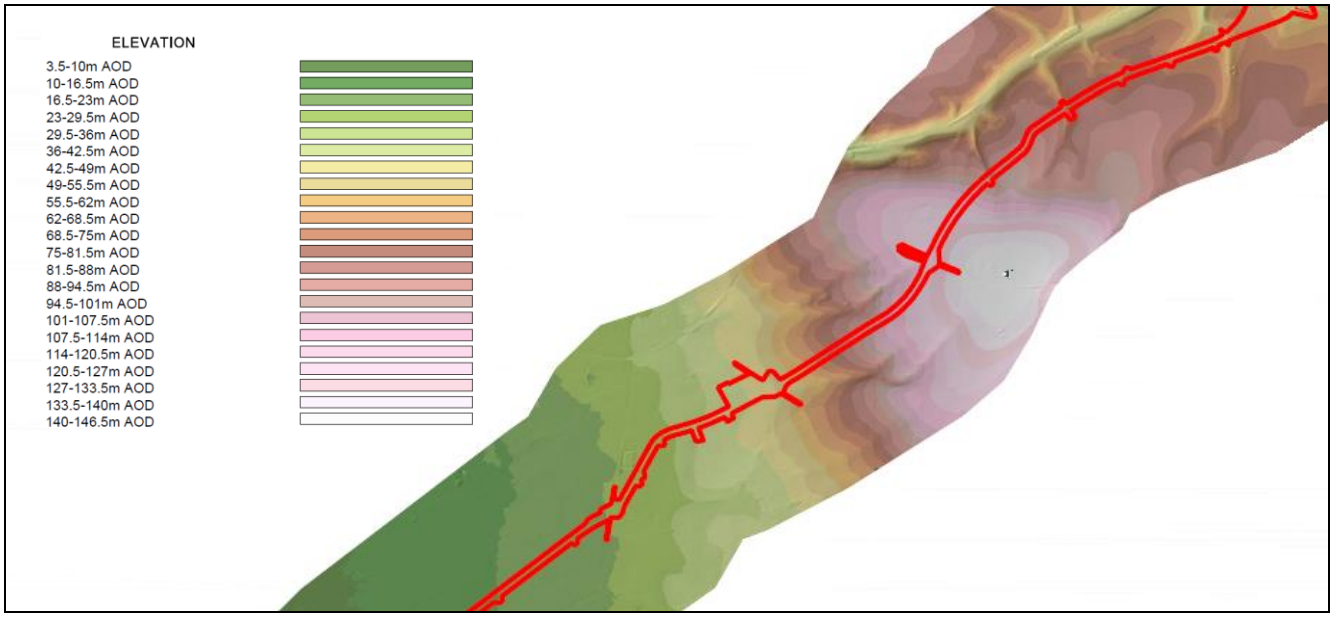
Moisture deficits for winter wheat range from 89-110mm and 77-102mm for potatoes. Therefore, drought is unlikely to be a key consideration on shallow textured and stony soils, notably in the area surrounding Drax Power station and on elevated sections of the Yorkshire Wolds. Soil wetness is likely to be a key consideration for much of the Project route, a result of heavier textured soils with low moisture deficits and moderately high field capacity days. This necessitates timely access onto land and for handling soil.

2.2 Topography

Publicly accessible Light Detection and Ranging data (LiDAR) was obtained to assess altitude and slopes along the Project.

Relief along the route is variable, rising from generally flat topography across the northern Holderness region, through elevated and undulated sections in the centre of the route across the Yorkshire Wolds. To the south and west of the Wolds the land becomes generally lower lying and gently undulating crossing the southern extent of the Vale of York and the flood plain of the River Ouse towards Drax.

Altitudes along the Project range from 0 - 135m Above Ordnance Datum (AOD). Gradients are usually less than 4° across most of the northern section of the route. The land slopes steeply south and west from the Wolds to flatter land to the south. Isolated slopes >7° are likely to limit land use and increase soil erosion risk in the central section of the route where the Project crosses the Yorkshire Wolds. Each field will have micro-topography which impacts surface water flows and dictates how it will be artificially drained. If a field is particularly steep, erosion mitigation may be required during the Project to avoid potential pollution incidents and soil losses.

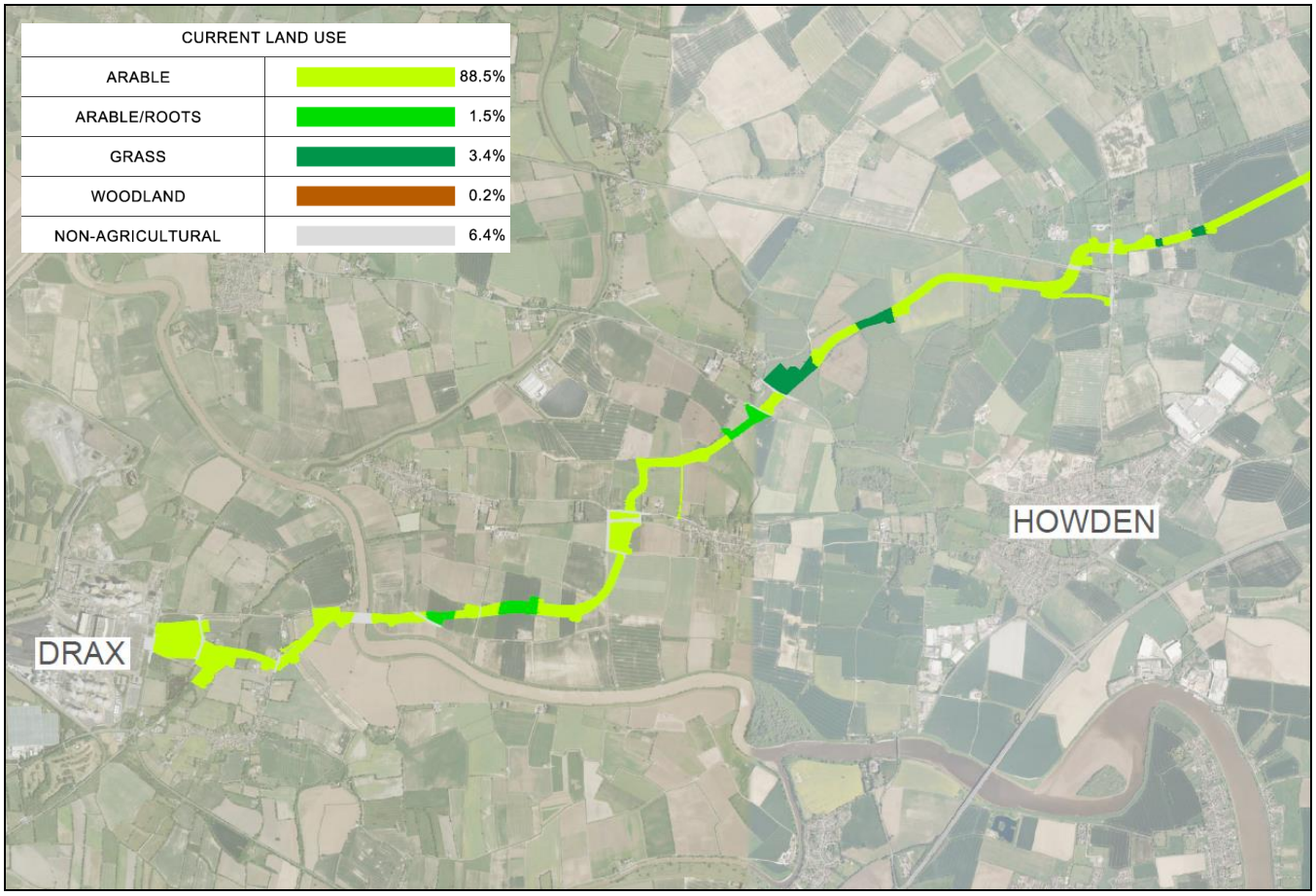


Extract from Figure 2 (Topography)– (Source: https://environment.data.gov.uk)

2.3 Land Use

An assessment of land use using historic aerial images from Google Earth (2009 - present day) has been carried out. Land use along the route was found to be primarily agricultural, notably to produce winter combinables of cereals and oil seed rape (arable). More recently, there has been a move to spring arable break crops of barley and oilseed rape to aid the control of blackgrass and brome. There are likely to be fields, particularly to the south of the route, where biomass crops such as miscanthus, or maize for anaerobic digestion, are grown. The route intersects a number of road, railways and watercourses where soils resources are likely disturbed or absent.

The composition of land use along the route is; arable (88.5%), arable and roots (1.5%), grass (3.4%), woodland (0.2%), non-agriculture (6.4%). These proportions are approximate and will vary year on year in line with crop rotations and land use changes. Discussions with landowners and tenants and field surveys will confirm land use closer to the start of construction.



Extract from Figure 3 (Land Use) – (Source: Google)

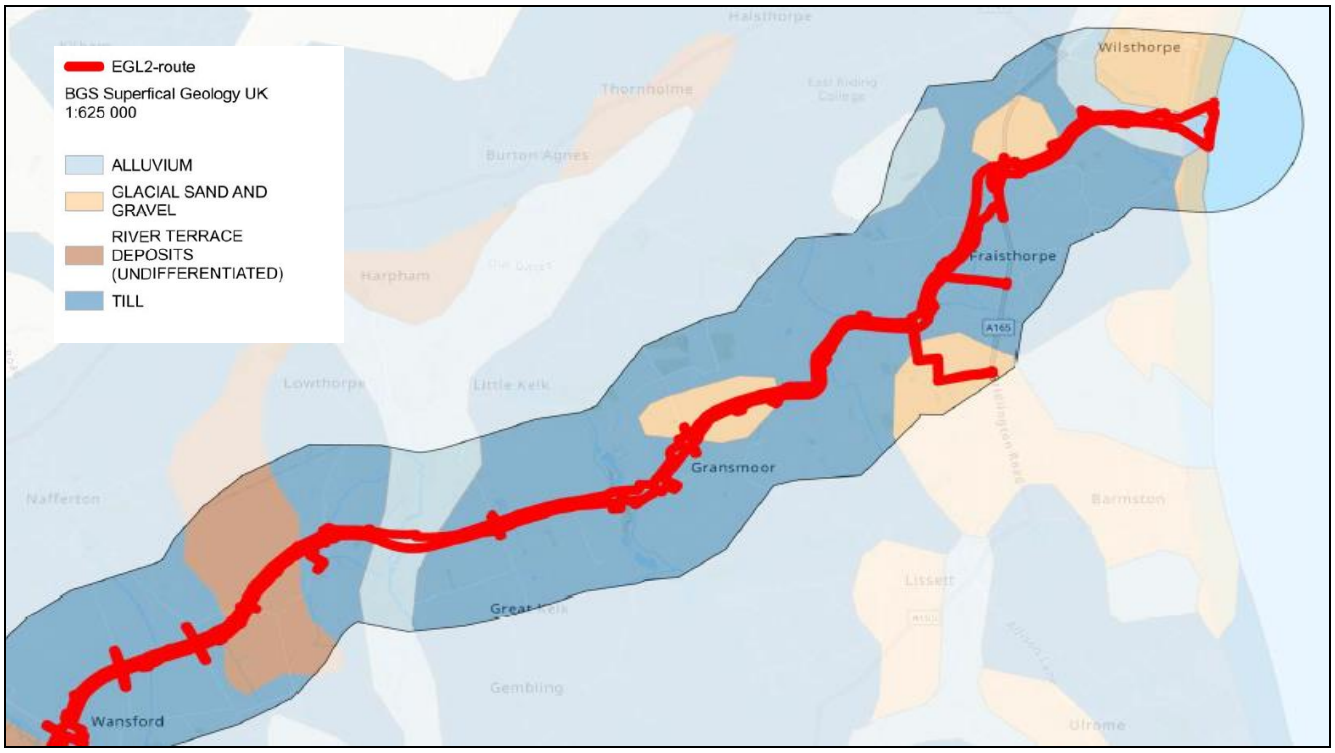
2.4 Geology

Superficial Geology

Publicly accessible national data of superficial geological deposits (1:625,000) has been downloaded from British Geological Survey (BGS) Website and assessed against the 1:50,000 scale.

Superficial deposits across the route tend to be variable. The northern coastal plain is occupied predominantly by glacial till with variable patterns of river terrace deposits and alluvium following the course of the River Hull and Kelk Beck. Drift is largely absent across elevated areas of the Yorkshire Wolds in the centre of the route.

To the south of the Wolds, superficial drift is dominated by lacustrine deposits of sand, silt and clay. Narrow bands of clayey sand and silt alluvium occur adjacent to the River Derwent and the River Humber, separated by isolated areas of Breighton sand deposits around Asselby and Drax. These superficial deposits have promoted the development of heavier textured soils with the propensity for drainage across the low-lying areas of the route.



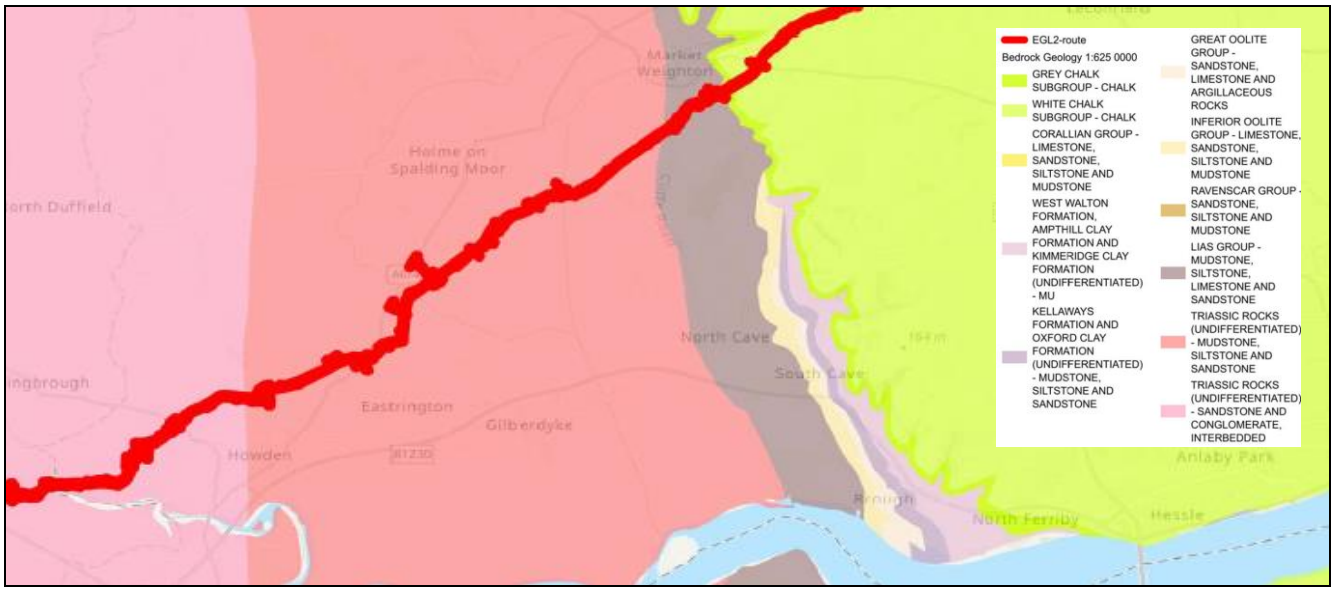
Extract from Figure 4a (Superficial Geology)– (Source: https://www.bgs.ac.uk/)

Bedrock Geology

Publicly accessible national data of geological bedrock (1:625,000 mapping) has been downloaded from the British Geological Survey (BGS) Website and assessed against the 1:50,000 scale.

North of Market Weighton the route is underlain by chalk of the Hunstanton, Welton, Burnham and Rowe Formations. On the coastal plain north of the Yorkshire Wolds, where underlying chalk is overlain by argillaceous deposits of till and alluvium, land drainage is likely to be prevalent as the deposit reduce the connectivity with the underlying chalk. The absence of significant superficial deposits in the elevated sections of the Yorkshire Wolds leads to more freely draining soils due to the permeable nature of their parent material and the connectivity with freely draining bedrock. In this area land drainage is likely to be more localised to deal with potential springs or deeper soils in valleys.

On the steep slopes falling from the Wolds bedrock is comprised of bands of argillaceous, calcareous mudstone and limestone formed as part of the Lias group. West of Market Weighton to Howden, bedrock is Mercia mudstone of Triassic age. Between Howden and Drax is bedrock of the Sherwood Sandstone Group containing a conglomerate of quartz and quartzite pebbles. Despite extensive underlying permeable parent geology, the drainage status of the land is largely determined by the slow permeability of overlying superficial drift and alluvial deposits often resulting in complex spatial variability in soils.



Extract from Figure 4b (Bedrock Geology) – (Source: https://www.bgs.ac.uk/)

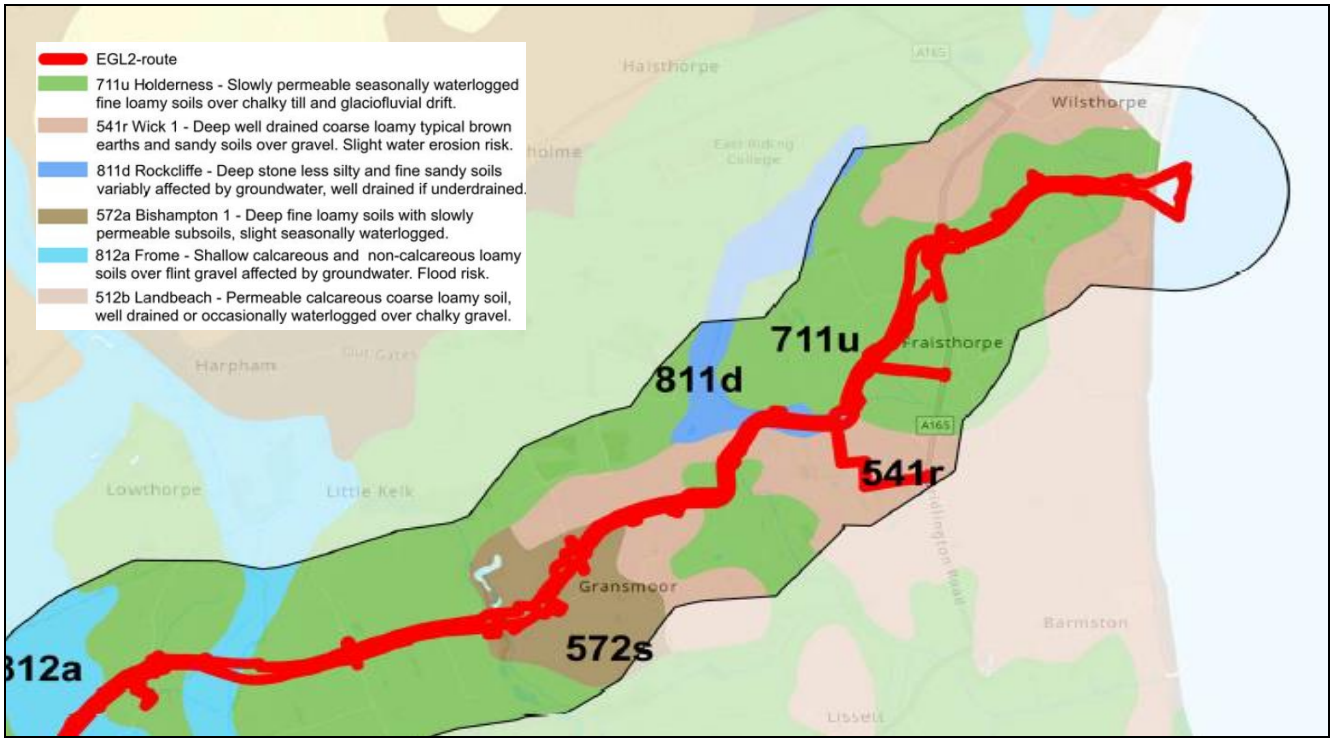
2.5 Soils

Publicly accessible national dataset of Soil Associations, as rationalised from National Soil Map (NATMAP Vector) was downloaded of at 1:250,000 scale. This was assessed against the *Soil Survey of England and Wales Sheet 1 : Northern England* (1:250,000 scales).

Between landfall and Middleton on the Wolds, soils are typically clayey and of the of the Holderness and Bishampton Associations. The slowly permeable subsoil in these soils increases the likelihood and intensity of underdrainage. Heavy textured soils are neighboured by areas of freely draining brown earth sandy soils and permeable calcareous soils of the Wick 1 and Landbeach Associations respectively. Adjacent to the River Hull and Kelk Beck soils are underlain with gravel and are variably affected by groundwater, being typical of the Frome Association. This land is at risk of flooding and seasonal waterlogging.

Between Middleton on the Wolds and Market Weighton, as the route crosses the Yorkshire Wolds, the soils alternate between freely draining and calcareous soils of the Hunstanton, Panholes and Andover Associations. The Andover Association typically occurs on crests and slopes. These soils are naturally freely draining, usually negating the need for artificial drainage.

Immediately south of the Yorkshire Wolds, soils become increasingly affected by ground water, despite deep sandy profiles of the Holme Moor association dominating this section, additional ditches and piped systems are required to improve their natural permeability. Inclusions of peaty surface layers are mapped in north-south orientation parallel to Cliffe Lane. South of Welham Bridge soils become clayey, composed of slowly permeable stoneless profiles of the Fladbury 3 and Foggathorpe Associations. On the floodplain of the Ouse, soils become permeable, comprised of fine silty Romney Association and sandy and coarse loamy Newport 1. These soils are frequently prone to high groundwater or flooding and require drainage by both pied systems and ditches.



Extract from Figure 5 (Soils) – (Source: https://www.landis.org.uk/data/nmvector.cfm)

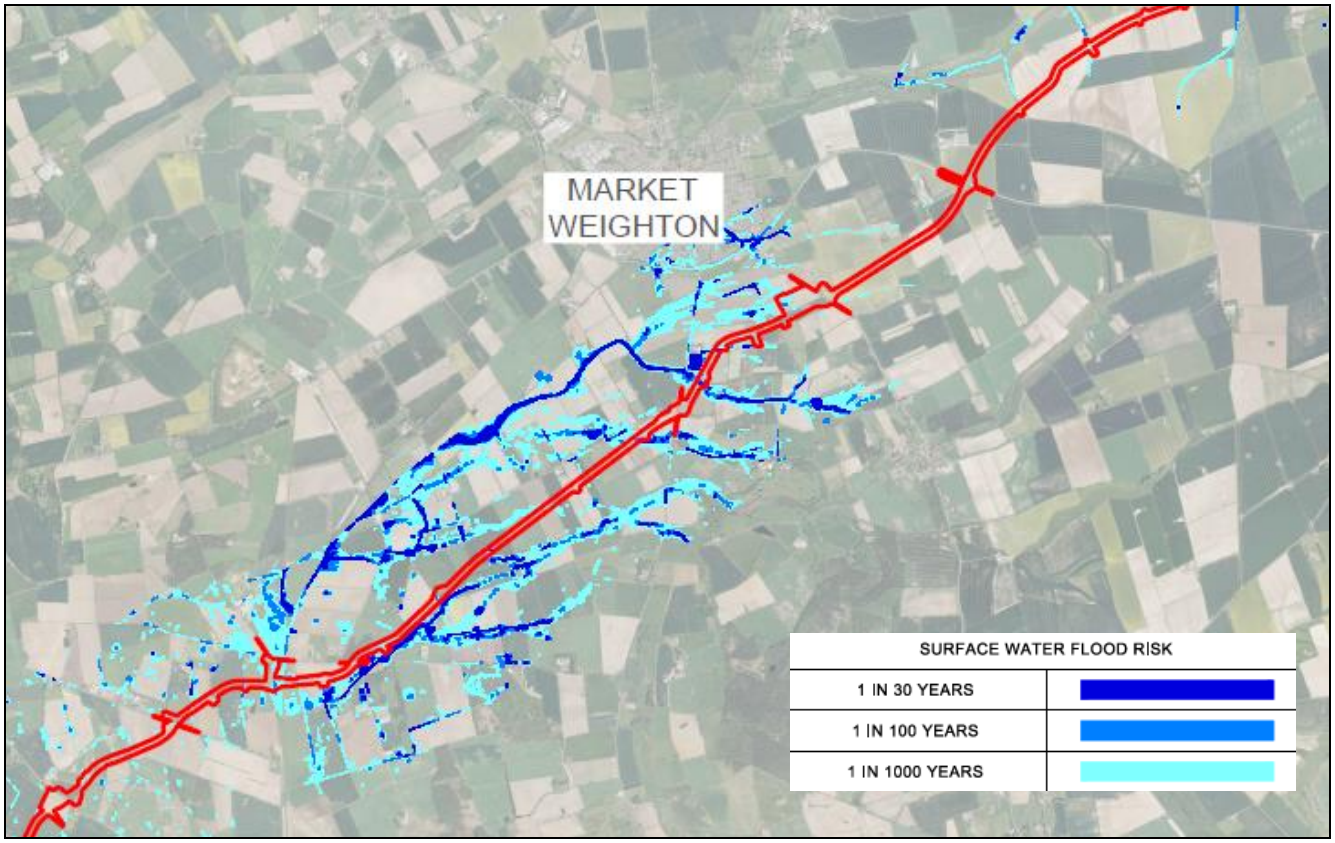
2.6 Surface Water Flood Risk

Surface water flood risk data is shown at Figure 6 for a 1 in 30/100/1000 year events. This indicates where water is expected to flood and locally wet/low areas where additional mitigation measures are likely to be required during the construction phase of the Project.

The section of the Project between the villages of Wilsthorpe and Hutton Cranswick has potential for widespread surface water issues, primarily around existing watercourses, but also is prevalent across low lying areas.

Over the Yorkshire Wolds there are very few watercourses. Surface water risk is limited around watercourses and only the most severe weather (1 in 1000 year event) is likely to cause water to stand across the surface over the Wolds.

The land from Market Weighton southwards is like the first section where there are some areas of land adjacent to watercourses which have a high risk from surface water flooding. Most of the Project route is away from the low points in the field, so localised surface water flooding will mostly be an issue where the route crosses or runs in close proximity to watercourses and lower lying areas.



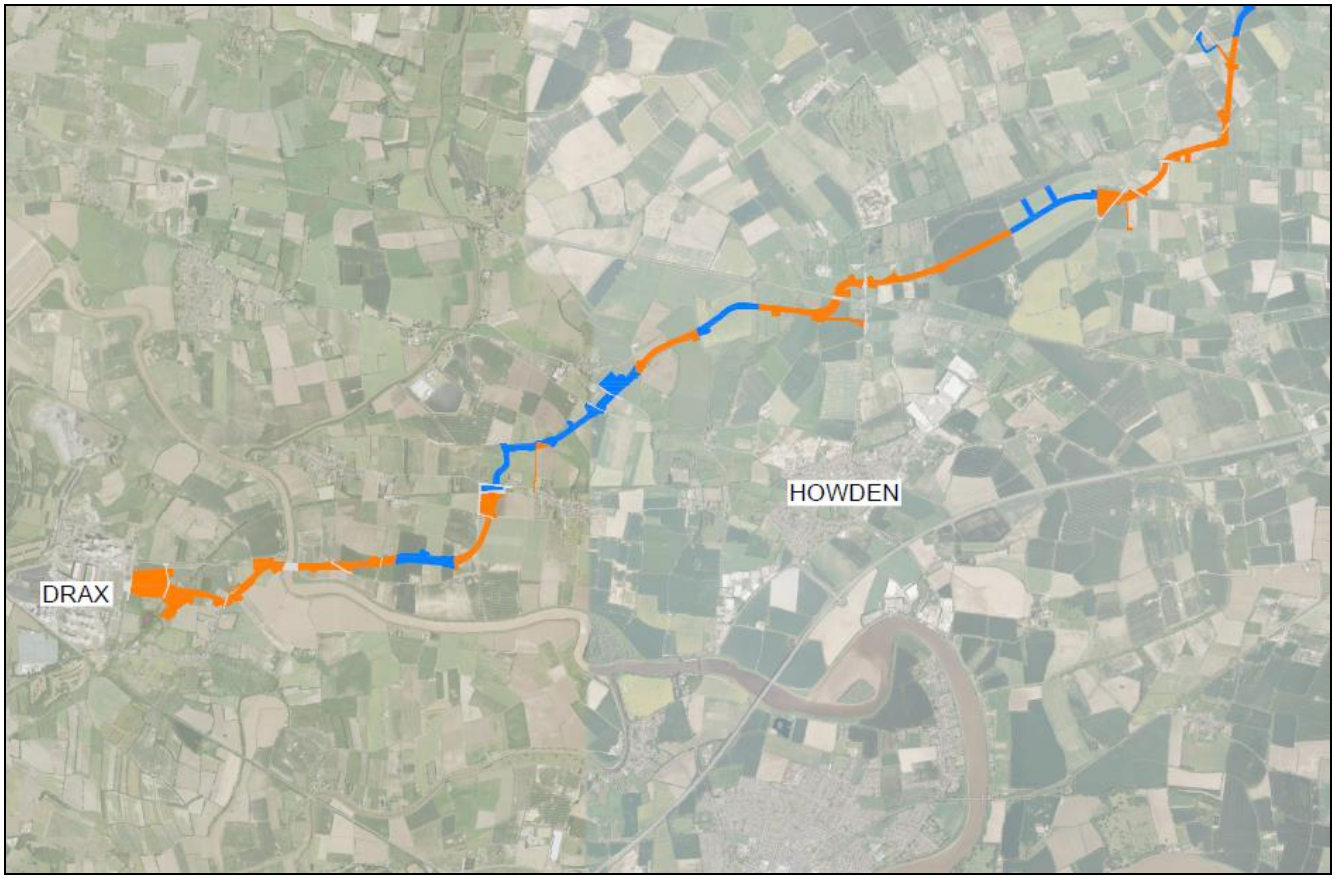
Extract from Figure 6 (Surface Water Flood Risk) (Source: https://environment.data.gov.uk/)

2.7 Known Underdrainage Systems

LDC has operated for the last 20 years nationally and predominantly across East and North Yorkshire. As a result, LDC have access to several paper and electronic plans showing installed drainage schemes.

In 2013, LDC were commissioned to undertake soils and land drainage surveys along the original National Grid Carbon Capture Scheme (CCS) which followed a very similar corridor to the EGL2 Project. As such, LDC has access to several relevant drainage plans.

LDC has sourced land drainage plans for approximately 19% of the proposed EGL2 route. An indication of whether information is available is indicated on Figure 7.



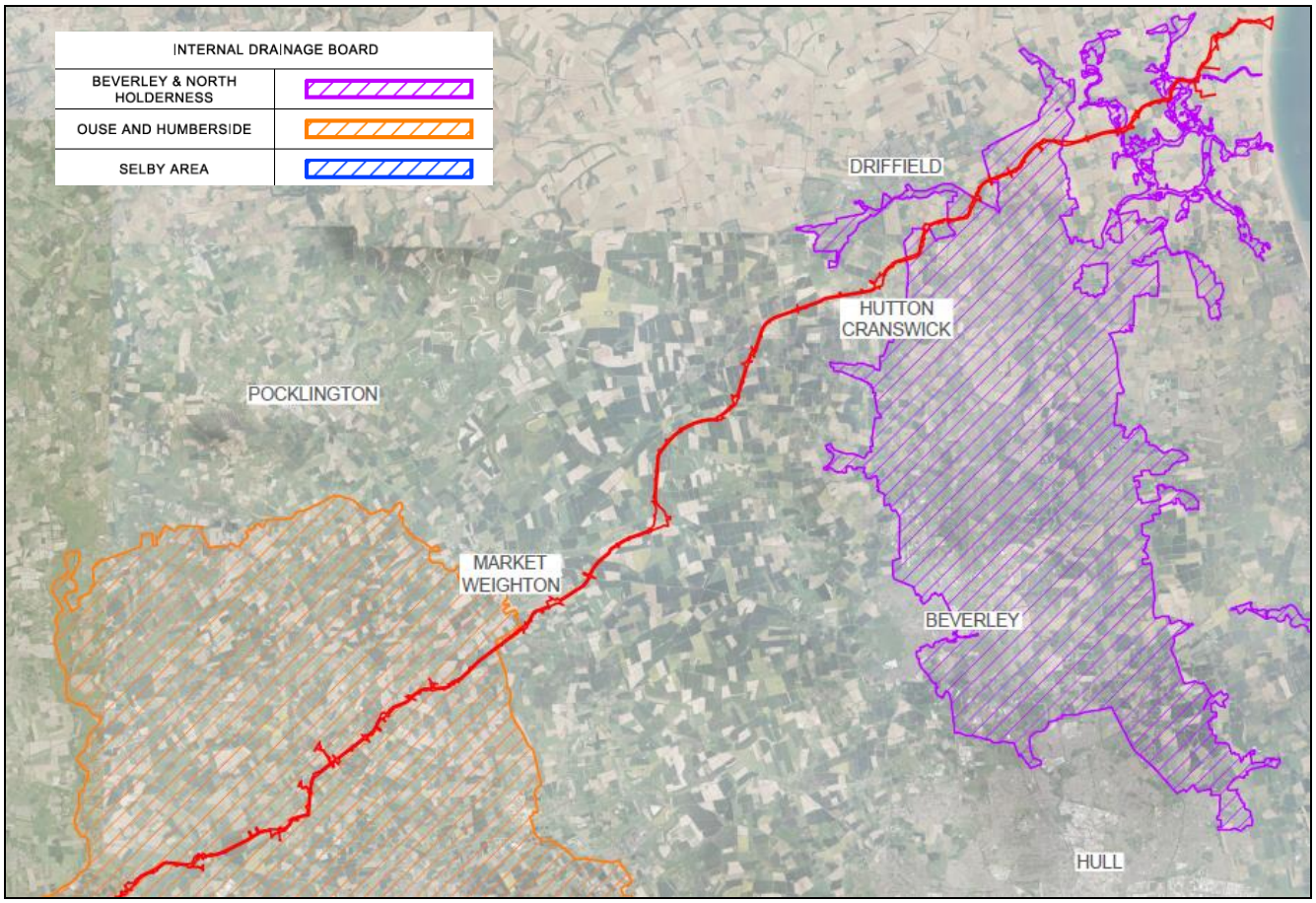
Extract from Figure 7 (Known Underdrainage Systems)

2.8 Internal Drainage Board Catchments

An Internal Drainage Board (IDB) is a local public authority that manages water levels across a catchment area by maintaining main ditches/drains, sluice gates and in some instances pumps. IDB's have a presence across areas of England and Wales where special drainage needs have been identified.

The proposed route bisects three IDB areas: Beverley & North Holderness, Ouse and Humber and the Selby Area. There are no IDB's across the Yorkshire Wolds.

Relevant IDB's will need to be consulted where the EGL2 Project route crosses an IDB maintained watercourse. Works including forming a crossing over a ditch, installing a drainage outfall, or undertaking a horizontal direction drill beneath a watercourse will all require consent from the IDB.



Extract from Figure 8 (Internal Drainage Board Catchments) – (Source: https://www.data.gov.uk)

3.0 Discussion

3.1 Soils

This study has found the EGL2 Project route is made up of a variety of soils, ranging from shallow, free draining soils found over the Yorkshire Wolds, through to heavily textured imperfectly to poorly drained soils to the northern and southern ends of the route.

The physical characteristics of soils will dictate when land along the route can be accessed and worked and is therefore likely to impact on work programmes and timescales. Different soil types along the route will require unique handling by the Project, specifically at the restoration stage.

The Desk Top study has identified 18 Soil Associations along the Project which could be grouped into 5-6 different soil types. Each soil type will exhibit a range of physical characteristics that necessitate further consideration during the design and build stages.

Potential impacts of the Project on soils include soil losses, soil mixing, soil structural deformation, soil contamination and pollution of watercourses.

The Project would be expected to undertake further detailed site surveys of soil resources along the entirety of the route to inform the environmental baseline; agricultural land quality; land condition record and land drainage design. An assessment of soil resources can also be used to develop a Project specific soil management plan to support the consenting and construction phases of the development.

3.2 Land Drainage

This study has also allowed LDC to assess what sections of the Project are likely to contain artificial land drainage. Based on the sources of information presented in this report, chiefly Figure 2: *Topography*, Figure 5: *Soils* and Figure 8: *Known Underdrainage Systems,* LDC expects that land along approx. 75% of the Project route will be artificially drained in some capacity.

The parts of the route where land is expected to be artificially drained stretches from landfall at Wilsthorpe, through to Bainton and then from where the Project route crosses Cliffe Road south of Market Weighton, all the way through to Drax. Where land is artificially drained, mitigation drainage systems, also referred to as 'pre' and 'post-construction' drainage will be required. By the nature of the soils, geology, and topography, almost all fields across the Yorkshire Wolds are unlikely to be drained. However, there are likely to be a few exceptions across several valley bottoms where soils tend to be deeper, groundwater levels higher and surface water ponding more common.

The potential impacts of the Project on land drainage include inadequate drainage both on and off the working areas leading to potential widespread flooding and ongoing crop losses. Disruption to existing drainage systems is also likely to cause disruption within the Project working areas which may lead to delays to the construction programme. Where there are key land drain crossings of the EGL2 cables, correct depths must be achieved to ensure land drainage can continue to function.

Land drainage systems will vary along the Project. The attributes of drainage systems will be dependant on soils, topography and cropping expectations. Typically, old clay tile drains and more recent plastic pipes of diameters ranging from 50mm to 300mm will be present at depths between 0.60m to 1.50m. Occasionally where larger 'carrier' drains are used, diameters could be larger and at depths up to 2.50m. Grading on drainage pipes is critical and on flatter sections of the Project, these could be as little as 0.10%

Based on experience of working on large-scale linear construction projects across the UK, LDC recommends that the Project carries out the following works:

- Landowners and/or tenants contacted and details of existing land drainage systems obtained.
- Site surveys completed to observe and record key drainage features and to undertake a detailed drainage topographical survey.
- Conceptual pre-construction drainage designs produced to ensure offsite land drainage systems continue to function during the construction phase of the project.
- Conceptual post-construction drainage schemes are designed to replace drains damaged within the Project construction areas and to alleviate soil structural degradation.

4.0 Conclusions

A variety of existing datasets have been sourced and assessed by LDC as part of a desk study of soils and land drainage along the proposed onshore cable section of the Eastern Green Link 2 (EGL2) project.

The results of the study have allowed LDC to provide an understanding as to the types of soils that will be encountered. This in turn notifies the Project that there will be varying limitations and special soil handling requirements throughout the construction phases of the EGL2 Project.

The study has also shed light on the proportions of the route that are likely to contain underdrainage systems and will require mitigation drainage systems to be implemented by the Project. The report also provides recommendations for soils and land drainage surveys to be completed which will facilitate the production of detailed reports and conceptual drainage designs.

FOR INFORMATION

N

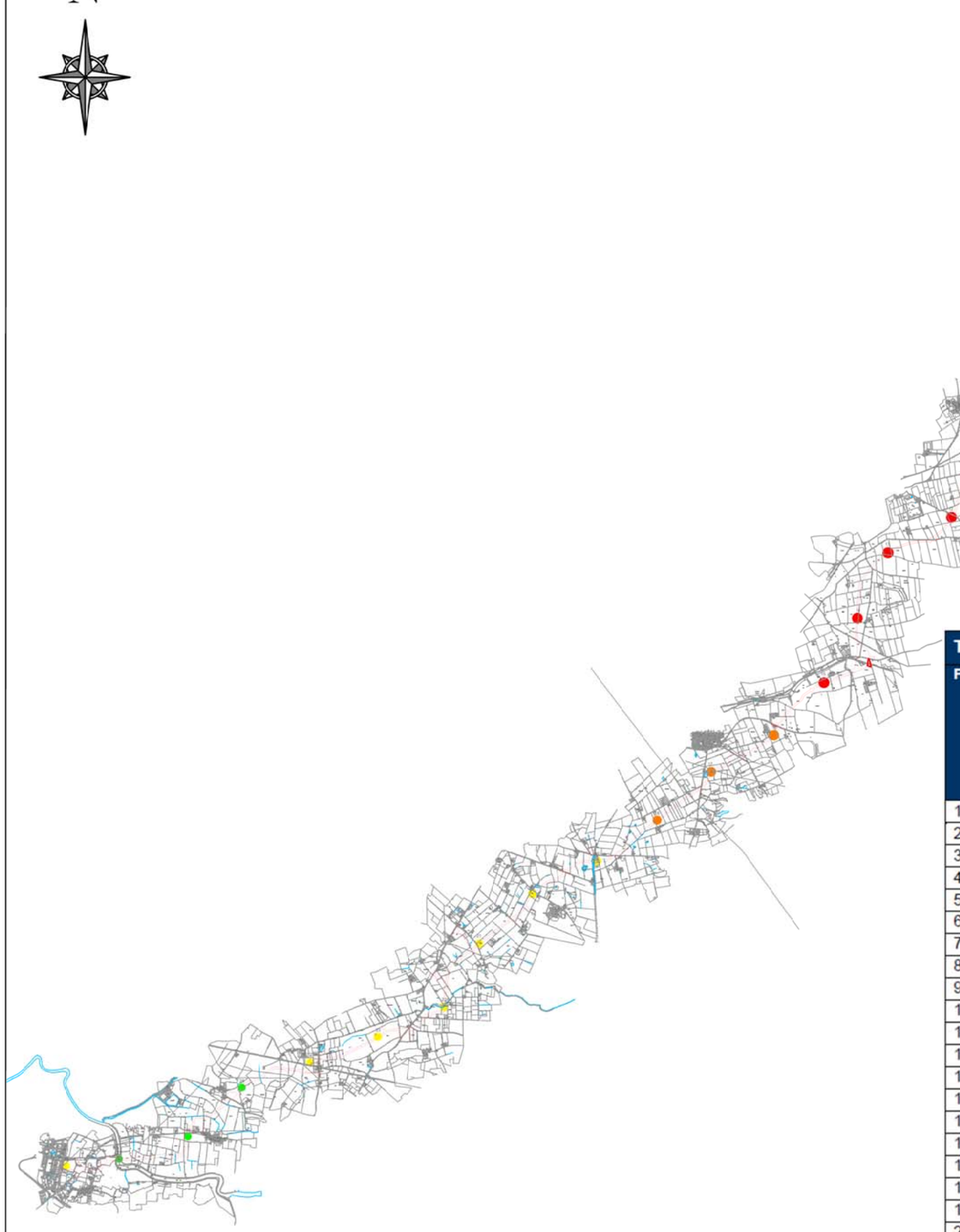


Table 1. Eastern Green Link 2: Climate Data

Point n°	Location	Grid reference TA/ SE (South-North)	Average Annual Rainfall (AAR) mm/year	Accumulated Temperature (ATO) day °C Jan-June	Field Capacity Period (FCD) Days/year
1	Wilsthorpe, Carnaby	TA 16936 63440	675	1373	165
2	A165, Fraisthorpe	TA 14858 62235	674	1367	164
3	Horse Carr Lane, Burton Agnes	TA 13269 60435	662	1372	160
4	Gransmoor Lane, Kelk	TA 11206 59203	670	1378	161
5	Warren Hill, Harpham	TA 08847 58739	679	1366	162
6	Carr Lane, Nafferton	TA 06806 57474	675	1358	159
7	Meggison's Turnpike, Skerne&Wansford	TA 05136 55748	647	1377	151
8	Burnbutts Lane, Hutton Cranswick	TA 03254 54257	670	1367	158
9	Burnbutts Lane, Hutton Cranswick	TA 01301 52857	691	1364	165
10	Burnbutts Lane, Hutton Cranswick	SE 98969 52277	720	1349	175
11	Station Road, Middleton, Bainton	SE 97045 50838	732	1334	181
12	Beverley Road, Middleton, Lund	SE 96163 48607	731	1329	181
13	Lund	SE 94067 47435	727	1338	182
14	Dalton Holme	SE 93042 45270	733	1332	181
15	Spring Road, Goodmanham	SE 91942 43137	745	1280	179
16	Wold Road, Market Weighton	SE 90279 41405	723	1274	172
17	Cliffe Road, Market Weighton	SE 88207 40189	671	1370	163
18	Long Lane, Market Weighton	SE 86415 38589	652	1392	153
19	Sand Lane, South Cliffe	SE 84426 37241	630	1399	145
20	Skiff Lane, Holme upon Spalding Moor	SE 82283 36153	651	1382	145
21	Bursea Lane, Bursea	SE 80528 34516	643	1385	134
22	Sleights lane, Eastrington	SE 79360 32420	627	1391	139
23	A614, Spaldington	SE 77171 31429	618	1386	134
24	Wood Lane, Wressle	SE 74922 30584	612	1372	132
25	A63, Newsholme, Wressle	SE 72665 29759	580	1395	125
26	Barmby on the Marsh, Asselby,	SE 70884 28141	593	1374	126
27	Redhouse Lane, Long Drax	SE 68600 27391	588	1397	124
28	Drax power station	SE 66853 27161	622	1380	129

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 1: CLIMATE DATA

CLIENT:
nationalgrid

KEY

Field Capacity Days (radi meterage equivalent to n° of days)

- <126 Field Capacity Days
- 126-150 Field Capacity Days
- 151-175 Field Capacity Days
- 176-225 Field Capacity Days

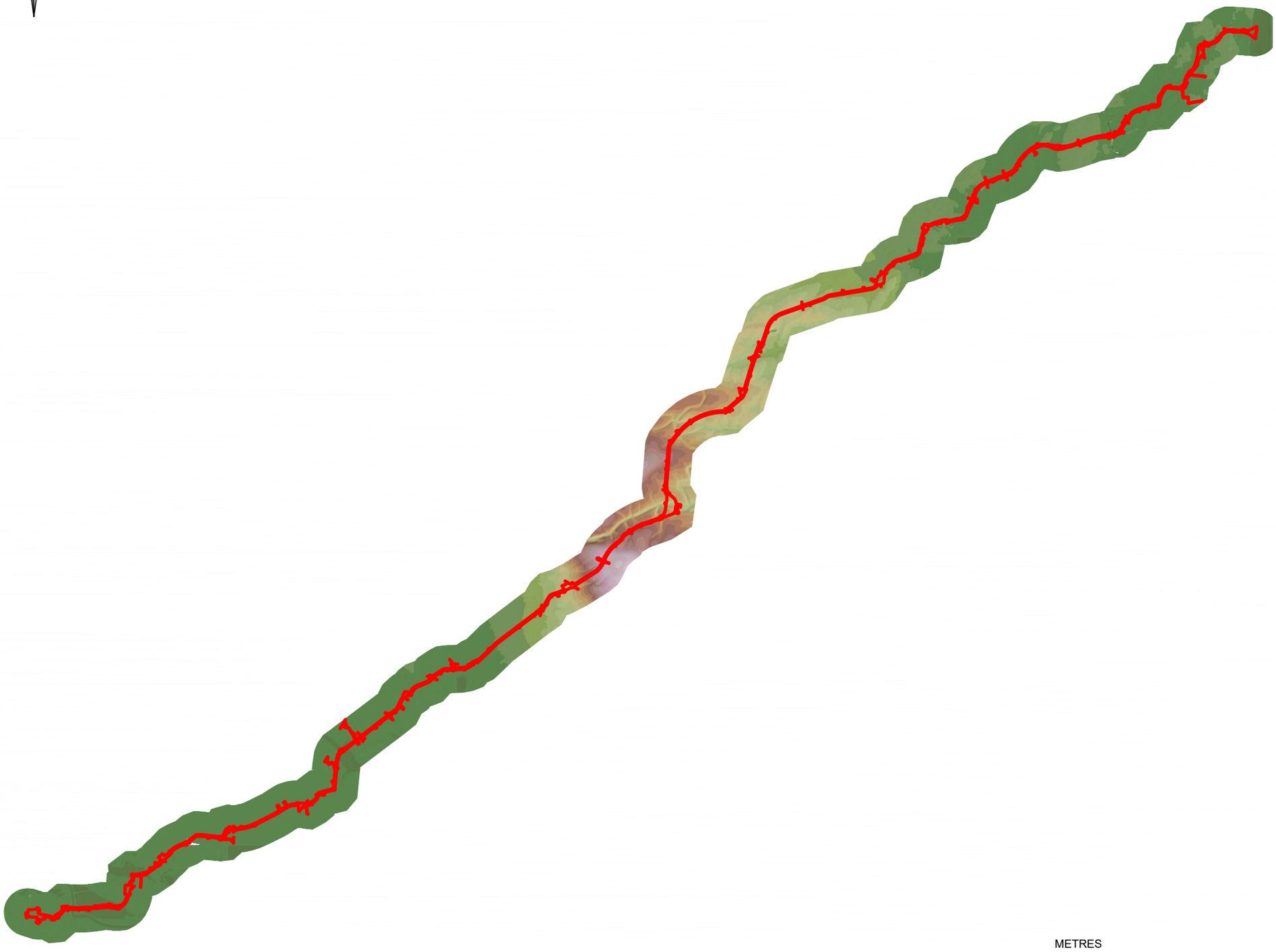
Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE	See scale bar	ORIG. SIZE	A3	SHEET	
DRAWN	AM	CHECKED	MF	APPROVED	MF
REVISION	A	DATE	05/08/2022		
DRAWING NO.	LDC_NG_EGL2_DesktopClimate.dwg				

N

FOR INFORMATION



METRES

5km 0 5km 10km

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 2
TOPOGRAPHY

CLIENT:
nationalgrid

KEY

PROPOSED CABLE ROUTE	

ELEVATION

-5-2.5m AOD	
2.5-10m AOD	
10-17.5m AOD	
17.5-25m AOD	
25-32.5m AOD	
32.5-40m AOD	
40-47.5m AOD	
47.5-55m AOD	
55-62.5m AOD	
62.5-70m AOD	
70-77.5m AOD	
77.5-85m AOD	
85-92.5m AOD	
92.5-100m AOD	
100-107.5m AOD	
107.5-115m AOD	
115-122.5m AOD	
122.5-130m AOD	
130-137.5m AOD	
137.5-145m AOD	
145-152.5m AOD	
152.5-160m AOD	

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE SEE SCALE BAR	ORIG. SIZE A3	SHEET Overview	
DRAWN BR	CHECKED MF	APPROVED MF	
REVISION A	DATE 05/08/2022		
DRAWING NO. LDC_NG_EGL2_DesktopStudy-LiDAR..dwg			

FOR INFORMATION

N

BRIDLINGTON

DRIFFIELD

HUTTON CRANSWICK

POCKLINGTON

MARKET WEIGHTON

BEVERLEY

HULL

HOWDEN

DRAX

METRES

5km 0 5km 10km

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 3
LAND USE

CLIENT:
nationalgrid

KEY

TYPICAL LAND USE	
ARABLE	88.5%
ARABLE/ROOTS	1.5%
GRASS	3.4%
WOODLAND	0.2%
NON-AGRICULTURAL	6.4%

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE	SEE SCALE BAR	ORIG. SIZE	A3	SHEET	Overview
DRAWN	BR	CHECKED	MF	APPROVED	MF
REVISION	A	DATE	05/08/2022		
DRAWING NO.	LDC_NG_EGL2_DesktopStudy-Landuse.dwg				

PROJECT: EASTERN GREEN LINK 2

TITLE: FIGURE 4A: SUPERFICIAL GEOLOGY

CLIENT: nationalgrid

KEY

EGL2-route

BGS Superfical Geology UK
1:625 000

- ALLUVIUM
- BLOWN SAND
- DRIFT GEOLOGY NOT MAPPED
- GLACIAL SAND AND GRAVEL
- LACUSTRINE DEPOSITS (UNDIFFERENTIATED)
- PEAT
- RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)
- TILL

0 1 2 4 6 8 Kilometers

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMMENDMENT	DATE:
A	FIRST ISSUE	05/08/2022

SCALE: SEE SCALE BAR	ORIG SIZE: A3	PLAN: 1 OF 5
DRAWN: AM	CHECKED: MF	APPROVED: MF
REVISION:	DATE: 05/08/2022	

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 4B: BEDROCK GEOLOGY

CLIENT:
nationalgrid

KEY

- EGL2-route

Bedrock Geology 1:625 0000

- GREY CHALK SUBGROUP - CHALK
- WHITE CHALK SUBGROUP - CHALK
- CORALLIAN GROUP - LIMESTONE, SANDSTONE, SILTSTONE AND MUDSTONE
- WEST WALTON FORMATION, AMPTHILL CLAY FORMATION AND KIMMERIDGE CLAY FORMATION (UNDIFFERENTIATED) - MU
- KELLAWAYS FORMATION AND OXFORD CLAY FORMATION (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
- GREAT OOLITE GROUP - SANDSTONE, LIMESTONE AND ARGILLACEOUS ROCKS
- INFERIOR OOLITE GROUP - LIMESTONE, SANDSTONE, SILTSTONE AND MUDSTONE
- RAVENSCAR GROUP - SANDSTONE, SILTSTONE AND MUDSTONE
- LIAS GROUP - MUDSTONE, SILTSTONE, LIMESTONE AND SANDSTONE
- TRIASSIC ROCKS (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE
- TRIASSIC ROCKS (UNDIFFERENTIATED) - SANDSTONE AND CONGLOMERATE, INTERBEDDED

0 1 2 4 6 8 Kilometers

Esri, CGIAR, USGS, Esri UK, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMMENDMENT	DATE:
A	FIRST ISSUE	05/08/2022
-		
-		

SCALE: SEE SCALE BAR	ORIG SIZE: A3	PLAN: 1 OF 5
DRAWN: AM	CHECKED: MF	APPROVED: MF
REVISION:	DATE: 05/08/2022	

PROJECT:

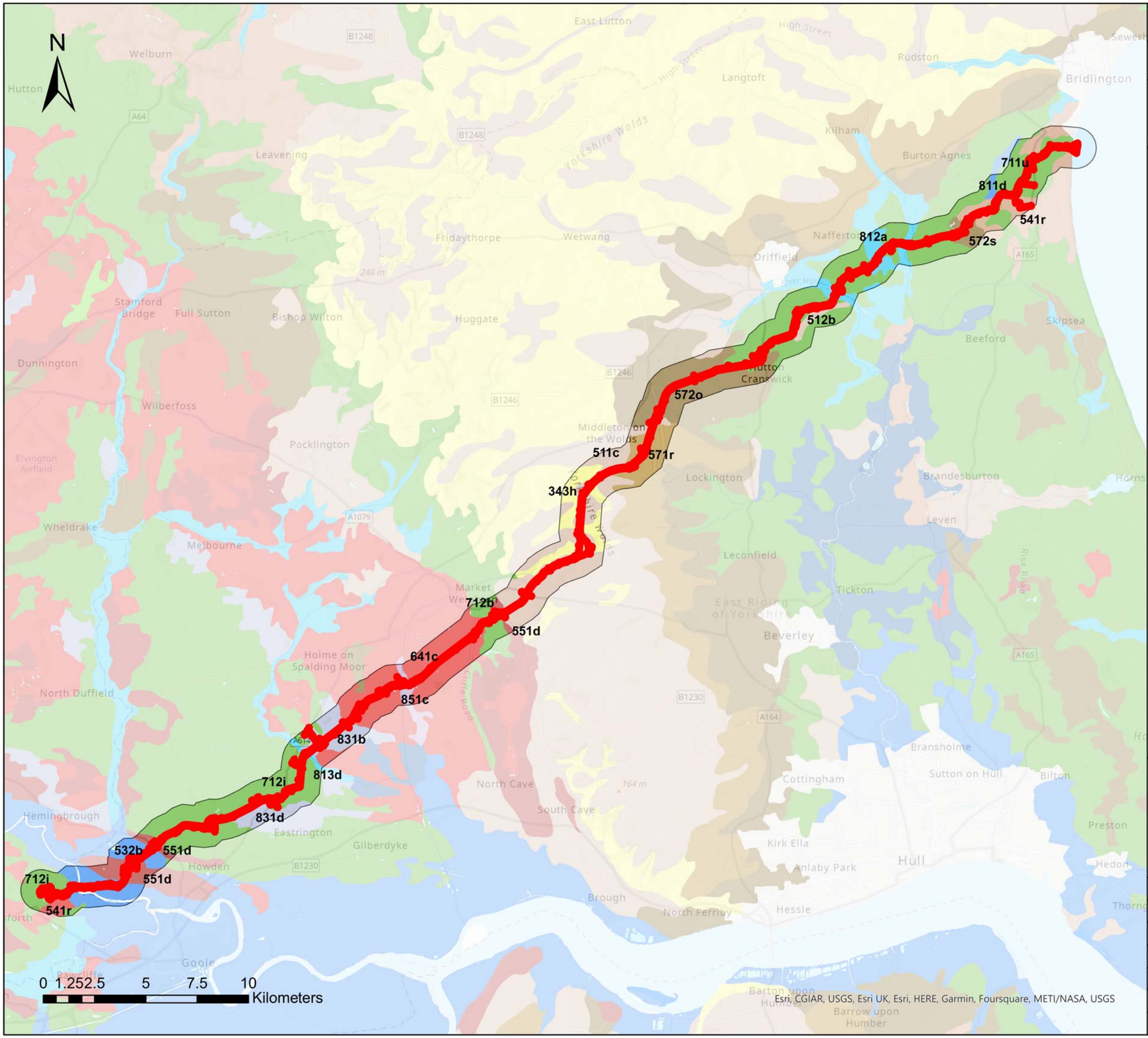
EASTERN GREEN LINK 2

TITLE:

FIGURE 5A: SOIL ASSOCIATIONS

CLIENT:

nationalgrid



KEY:

- EGL2-route
- 711u Holderness - Slowly permeable seasonally waterlogged fine loamy soils over chalky till and glaciofluvial drift.
- 541r Wick 1 - Deep well drained coarse loamy typical brown earths and sandy soils over gravel. Slight water erosion risk.
- 811d Rockcliffe - Deep stone less silty and fine sandy soils variably affected by groundwater, well drained if underdrained.
- 572s Bishampton 1 - Deep fine loamy soils with slowly permeable subsoils, slight seasonally waterlogged.
- 812a Frome - Shallow calcareous and non-calcareous loamy soils over flint gravel affected by groundwater. Flood risk.
- 512b Landbeach - Permeable calcareous coarse loamy soil, well drained or occasionally waterlogged over chalky gravel.
- 572o Burlingham 2 - Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.
- 571r Hunstanton - Deep well drained often reddish fine and coarse loamy soils, some calcareous soils.
- 511c Panholes - Well drained calcareous fine silty soils over chalk.
- 343h Andover 1 - Shallow well drained calcareous silty soils over chalk slopes and crests.
- 551d Newport 1 - Deep well drained sandy and coarse loamy soils, occasionally waterlogged. Wind and water erosion risk.
- 712b Denchworth - Slowly permeable seasonally waterlogged clayey soils, some calcareous.
- 641c Holme Moor - Deep stoneless, naturally very acid fine sandy soils, bleached subsurface affected by groundwater. Well drained where ditched. Risk of wind erosion.
- 851c Downholland 3 - Deep stoneless clayey soils with peaty surface over sandy gravel. Groundwater controlled by ditches. Risk of wind erosion.
- 831b Sessay - Fine and coarse loamy often stoneless, permeable soils affected by groundwater over clay.
- 813d Fladbury 3 - Stoneless clayey, fine silty and fine loamy soils affected by groundwater. Slow permeability occurring within 40cm. Flood risk.
- 532b Romney - Deep stoneless permeable calcareous coarse and fine silty soils. Ditches control groundwater.
- 712i Foggathorpe 2 - Slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clayey soils.

Land Drainage Consultancy Ltd

Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMMENDMENT	DATE:
A	FIRST ISSUE	09/08/22
-		
-		

SCALE: SEE SCALE BAR	ORIG SIZE: A3	PLAN: 1 OF 5
DRAWN: AM	CHECKED: MF	APPROVED: MF
REVISION:	DATE: 09/08/22	

FOR INFORMATION

N

BRIDLINGTON

DRIFFIELD

HUTTON CRANSWICK

POCKLINGTON

MARKET WEIGHTON

BEVERLEY

HULL

HOWDEN

DRAX

METRES
5km 0 5km 10km

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 6
SURFACE WATER FLOOD RISK

CLIENT:
nationalgrid

KEY

PROPOSED CABLE ROUTE	
SURFACE WATER FLOOD RISK	
1 IN 30 YEARS	
1 IN 100 YEARS	
1 IN 1000 YEARS	

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE	SEE SCALE BAR	ORIG. SIZE	A3	SHEET	Overview
DRAWN	BR	CHECKED	MF	APPROVED	MF
REVISION	A	DATE	05/08/2022		

DRAWING NO. LDC_NG_EGL2_DesktopStudy-FloodRisk..dwg

FOR INFORMATION

N

BRIDLINGTON

DRIFFIELD

HUTTON CRANSWICK

POCKLINGTON

MARKET WEIGHTON

BEVERLEY

HULL

HOWDEN

DRAX

METRES

5km 0 5km 10km

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 7
KNOWN AGRICULTURAL DRAINAGE

CLIENT:
nationalgrid

KEY

EXISTING AGRICULTURAL DRAINAGE	
KNOWN DRAINAGE	19%
NO KNOWN DRAINAGE	74%
NON-AGRICULTURAL	7%

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE SEE SCALE BAR	ORIG. SIZE A3	SHEET Overview	
DRAWN BR	CHECKED MF	APPROVED MF	
REVISION A	DATE 05/08/2022		
DRAWING NO. LDC_NG_EGL2_DesktopStudy-KnownExistingDrainage_recover.dwg			

FOR INFORMATION

N

BRIDLINGTON

DRIFFIELD

HUTTON CRANSWICK

POCKLINGTON

MARKET WEIGHTON

BEVERLEY

HULL

HOWDEN

DRAX

METRES

5km 0 5km 10km

PROJECT:
EASTERN GREEN LINK 2

TITLE:
FIGURE 8
INTERNAL DRAINAGE BOARDS

CLIENT:
nationalgrid

KEY

PROPOSED CABLE ROUTE	
INTERNAL DRAINAGE BOARD	
BEVERLEY & NORTH HOLDERNESS	
OUSE AND HUMBER	
SELBY AREA	

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
A	First issue	05/08/2022

SCALE	SEE SCALE BAR	ORIG. SIZE	A3	SHEET	Overview
DRAWN	BR	CHECKED	MF	APPROVED	MF
REVISION	A	DATE	05/08/2022		
DRAWING NO.	LDC_NG_EGL2_DesktopStudy-IDBareas.dwg				

LAND DRAINAGE AND SOILS

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

STATEMENT OF EVIDENCE

APPENDIX 2, PAGE 27

CABLE DEPTH MAP

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:
CABLE DEPTH

nationalgrid

KEY

COLOUR	DESCRIPTION AND MIN. COVER	PERCENT OF TOTAL SCHEME LENGTH (APPROXIMATE)
	CATEGORY 1 - 1200 MM	82%
	CATEGORY 2 - 900 MM	18%

REV	AMENDMENT	DATE
A	FIRST ISSUE	31/01/23
B	UPDATES	03/02/23

SCALE	1:20,000	ORIG. SIZE	A3	SHEET	1 OF 1
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	B	DATE	03/02/23		
DRAWING NO.	LDCL_NG_EGL2_Cable_Depth.dwg				

LAND DRAINAGE AND SOILS

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

STATEMENT OF EVIDENCE

APPENDIX 3, PAGES 28-34

EXAMPLES OF PRE AND POST-CONSTRUCTION DRAINAGE SYSTEMS

1

N

Low / wet area

18.06

Drainage Scheme
Installed 1975
From Original Plan

Line of suspected drain

Winter wheat 23

50m 0m 50m 100m

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:

TYPICAL LAND DRAINAGE SURVEY PLANS

nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	1
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		

DRAWING NO. LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg

2

Ditch water level: 18.60mAOD

Existing 6 inch diameter clay tile outfall
Invert: 18.10mAOD
Drain contains 70% silt
Outfall submerged 0.40m under water

A

Ditch water level: 17.95mAOD

Ditch to be cleared out
between points A and B

No outfall found in ditch

B

PROPOSED CROSSING DRAIN
FINAL DETAILS TO BE CONFIRMED

120

174

149

INV-17

40

INV-18

173

151

INV-16

18.06

Low area
Ground level: 19.65mAOD

Line of suspected drain

Winter wheat 23

50m 0m 50m 100m

N

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:
TYPICAL CONCEPTUAL PRE-CONSTRUCTION DRAINAGE PROPOSALS

nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	2
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		

DRAWING NO. LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg

3

Ditch water level: 18.60mAOD

Existing 6 inch diameter clay tile outfall
Invert: 18.10mAOD
Drain contains 70% silt
Outfall submerged 0.40m under water

A

Ditch water level: 17.95mAOD

Ditch to be cleared out between points A and B

No outfall found in ditch

B

All existing drains to be connected into new offsite main drain

120

Existing 6 inch dia. clay tile
Clear and Running
Cover: 1.00m
Invert at cable crossing 18.15mAOD

174

149

40

173

151

18.06

Existing 3 inch dia. clay tile.
Clear and Running
Cover: 1.30m
Invert: 18.25mAOD

Suspected drain investigated
Nothing found

Low area
Ground level: 19.65mAOD

N

50m 0m 50m 100m

FOR CONSTRUCTION

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:
TYPICAL
FINAL
PRE-CONSTRUCTION
DRAINAGE PROPOSALS

nationalgrid

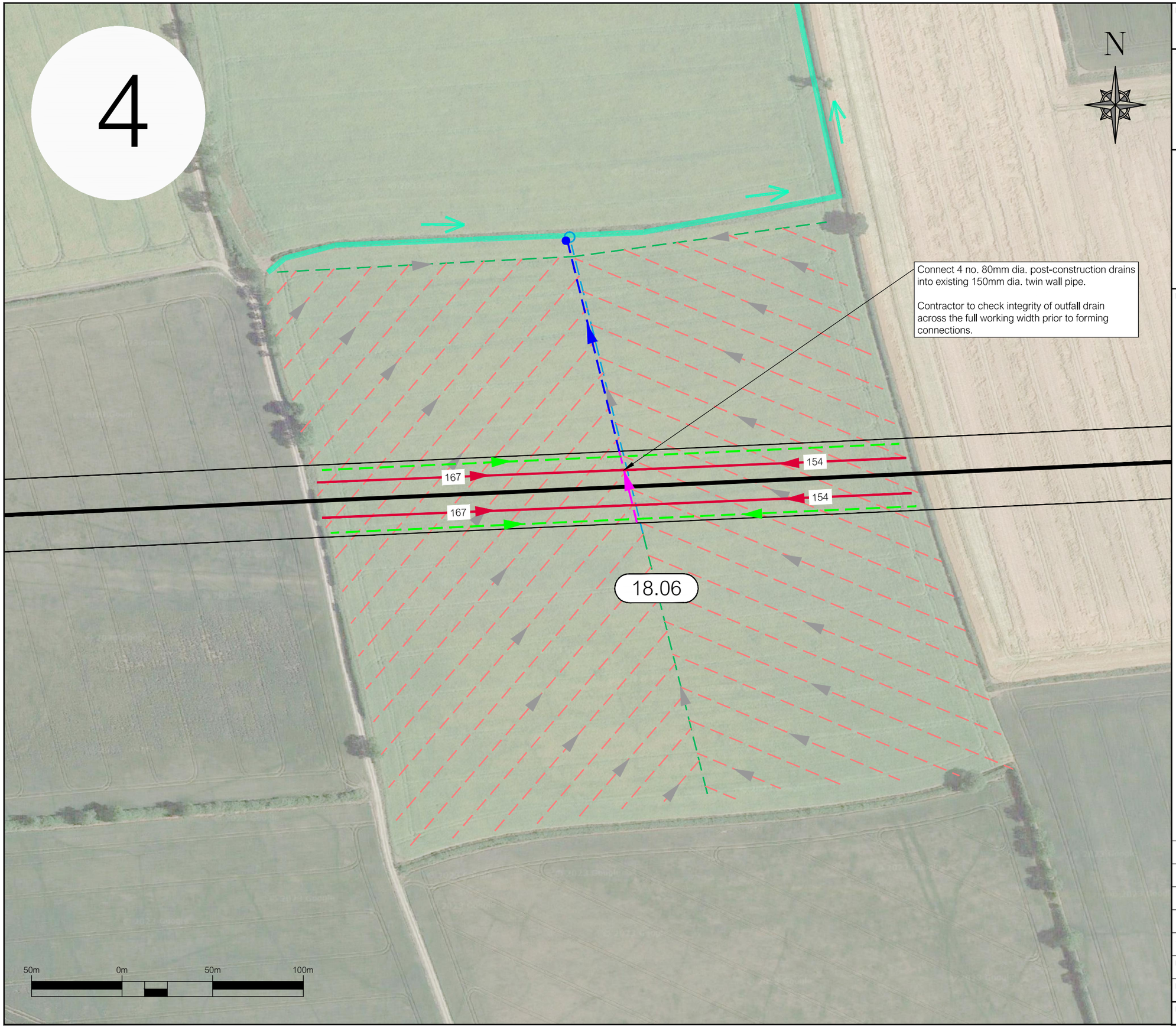
KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	3
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		

DRAWING NO. LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg

4



PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND GRID GREENLINK 2

TITLE:

TYPICAL POST-CONSTRUCTION DRAINAGE PROPOSAS

nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	4
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		

DRAWING NO. LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg

5

N

Ditch water level: 22.000mAOD

Existing 80mm diameter plastic outfall
Invert: 22.10mAOD
Outfall Clear & Running

Existing 80mm diameter plastic outfall
Invert: 22.11mAOD
Outfall Clear & Running

Existing 80mm diameter plastic outfall
Invert: 22.06mAOD
Outfall Clear & Running

Existing 80mm diameter plastic outfall
Invert: 22.05mAOD
Outfall Clear & Running

Proposed 160mm dia. outfall

78

INV-26 INV-25 INV-24 INV-23 INV-22 INV-21

314

Proposed temporary
interceptor drain
(160mm dia.)

22.04

Oil Seed Rape 23

Drainage Scheme
Installed 2002
From Original Plan

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:
TYPICAL
CONCEPTUAL
PRE-CONSTRUCTION
DRAINAGE PROPOSALS
(DIRECT OUTFALLS)

nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	5
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		
DRAWING NO.	LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg				

6

CABLE DEPTH BETWEEN POINTS X AND Y TO CONSIDER EXISTING DRAINAGE SYSTEM (SEE PLAN FOR DETAILS AND LEVELS)

N

Existing 80mm dia. plastic outfall
Clear and Running
Invert at cable crossing 22.18mAOD

Existing 80mm dia. plastic outfall
Clear and Running
Invert at cable crossing 22.15mAOD

Proposed 160mm dia. outfall

78

X

Y

314

Existing 80mm dia. plastic outfall
Clear and Running
Invert at cable crossing 22.22mAOD

Existing 80mm dia. plastic outfall
Clear and Running
Invert at cable crossing 22.16mAOD

Proposed temporary interceptor drain (160mm dia.)

22.04

Oil Seed Rape 23

Drainage Scheme
Installed 2002
From Original Plan

FOR CONSTRUCTION

PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND
GRID GREENLINK 2

TITLE:
TYPICAL
FINAL
PRE-CONSTRUCTION
DRAINAGE PROPOSALS
(DIRECT OUTFALLS)

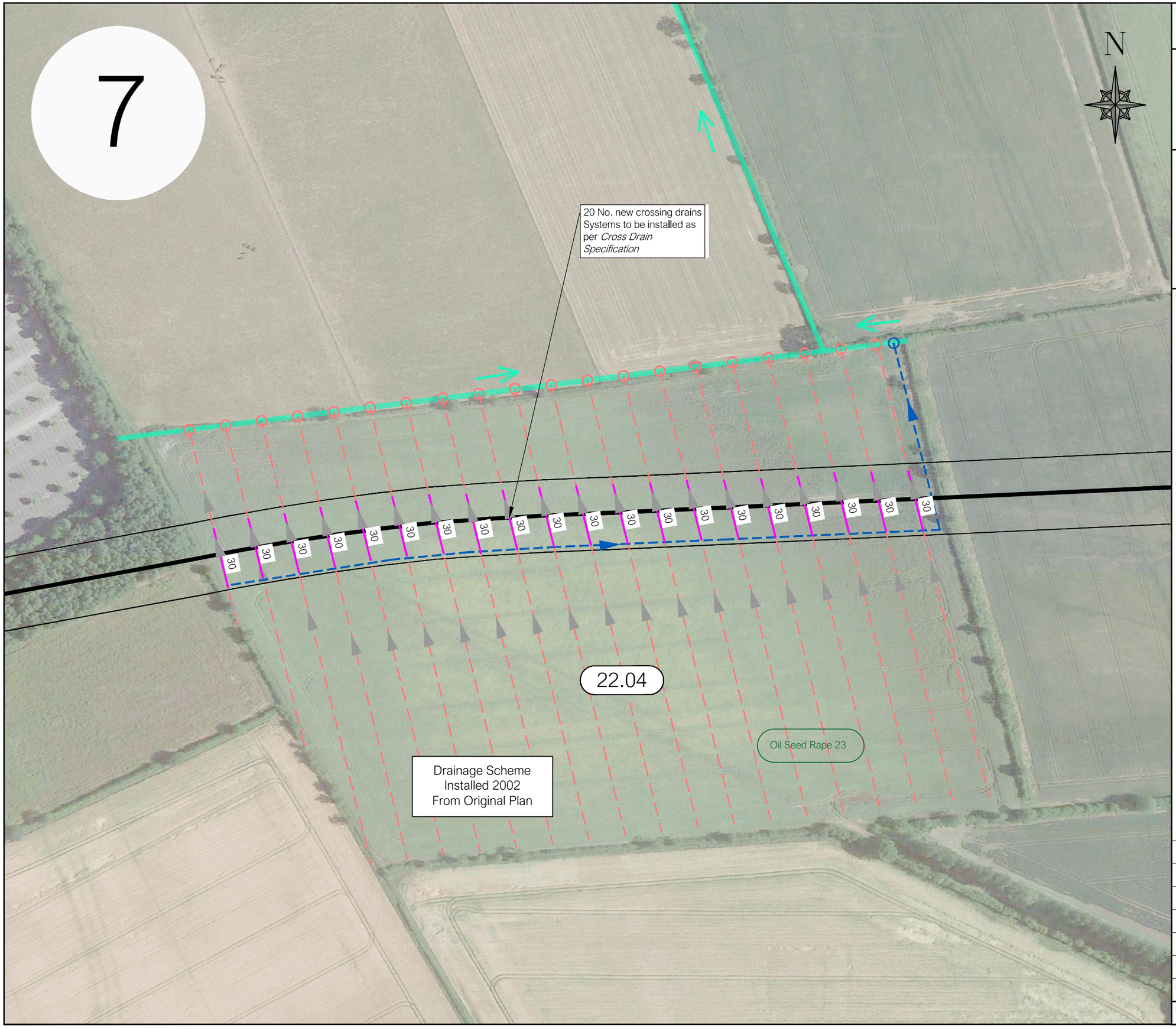
nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE 1:2,000	ORIG. SIZE A3	SHEET 6	
DRAWN MF	CHECKED DS	APPROVED --	
REVISION A	DATE 03/02/23		
DRAWING NO. LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg			

7



PROJECT:
NATIONAL GRID SCOTLAND TO ENGLAND GRID GREENLINK 2

TITLE:
TYPICAL POST-CONSTRUCTION DRAINAGE PROPOSALS (DIRECT OUTFALLS)

nationalgrid

KEY

REV	AMENDMENT	DATE
A	FIRST ISSUE	03/02/23

SCALE	1:2,000	ORIG. SIZE	A3	SHEET	7
DRAWN	MF	CHECKED	DS	APPROVED	--
REVISION	A	DATE	03/02/23		
DRAWING NO.	LDCL_NG_EGL2_Examples of Pre and Post Con Drainage.dwg				

LAND DRAINAGE AND SOILS

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

STATEMENT OF EVIDENCE

APPENDIX 4, PAGES 35-36

LAND AND DRAINAGE QUESTIONNAIRE

Scotland to England Grid Link 2 (SEGL2)

Land and Drainage Questionnaire

Landowner or tenant name:

Contact number:

LDC plot number(s):

CPO plot number(s):

Date of meeting:

Meeting location:

Agent's details:

Present at meeting:

Farming

1 How long have you farmed the land?

2 What is the current land use, eg agricultural, recreational, forestry etc along the proposed route?

3 What is the current cropping and proposed cropping over the next 2 years along the proposed route?

4 Are you aware of any animal and plant health issues i.e. Bovine TB, potato cyst nematodes ?

5 Are you aware of any other known hazards and if so please provide details.

6 Has the farm any biosecurity requirements?

7 Are you aware of any animal burial pits or former landfill sites?

8 Is the farm affected by Black-grass, if so please provide details.

9 Has the farm organic status?

10 What is the approximate depth of the topsoil / make up of the subsoil?

11 What are normal cultivation methods on the farm?

12 What types and depths of subsoiling or moling depths are carried out?

13	Are you aware of any other underground structures present that may affect the proposed route?
14	Within the limits of deviations are there any specific objects that the cables need to avoid eg a mine shaft, a specific tree / hedge etc

Land Drainage

15	Is the land drained along the proposed route?
16	Are drainage plans available?
17	What are the typical depths of land drains?
18	If there are no land drainage plans, are you aware of any current drainage outfalls / are these on your land or do other third parties have rights to use these?
19	Are there any watercourse. Ditches or culverts to your knowledge where EA/ IDB consent to cross will be required?
20	Are you aware of any existing drainage issues along the route?
21	Are you aware of any historic flooding issues along the route?
22	Are you aware of any springs, wells or boreholes that affect the route?
23	Are you aware of any groundwater issues along the route?

Additional Comments

Signed